Nokia Customer Care

Service Manual

RM-78 (Nokia 6280)
Mobile Terminal
Part No: 9243566 (Issue 1)

COMPANY CONFIDENTIAL

NOKIA

Amendment Record Sheet

Amendment No	Date	Inserted By	Comments
Original issue	10/2005	G Rudh	

Copyright

Copyright © 2005 Nokia. All rights reserved.

Reproduction, transfer, distribution or storage of part or all of the contents in this document in any form without the prior written permission of Nokia is prohibited.

Nokia, Nokia Connecting People, and Nokia X and Y are trademarks or registered trademarks of Nokia Corporation. Other product and company names mentioned herein may be trademarks or tradenames of their respective owners.

Nokia operates a policy of continuous development. Nokia reserves the right to make changes and improvements to any of the products described in this document without prior notice.

Under no circumstances shall Nokia be responsible for any loss of data or income or any special, incidental, consequential or indirect damages howsoever caused.

The contents of this document are provided “as is„. Except as required by applicable law, no warranties of any kind, either express or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose, are made in relation to the accuracy, reliability or contents of this document. Nokia reserves the right to revise this document or withdraw it at any time without prior notice.

The availability of particular products may vary by region.

IMPORTANT

This document is intended for use by qualified service personnel only.

Warnings and cautions

Warnings

- IF THE DEVICE CAN BE INSTALLED IN A VEHICLE, CARE MUST BE TAKEN ON INSTALLATION IN VEHICLES FITTED WITH ELECTRONIC ENGINE MANAGEMENT SYSTEMS AND ANTI-SKID BRAKING SYSTEMS. UNDER CERTAIN FAULT CONDITIONS, EMITTED RF ENERGY CAN AFFECT THEIR OPERATION. IF NECESSARY, CONSULT THE VEHICLE DEALER/ MANUFACTURER TO DETERMINE THE IMMUNITY OF VEHICLE ELECTRONIC SYSTEMS TO RF ENERGY.
- THE PRODUCT MUST NOT BE OPERATED IN AREAS LIKELY TO CONTAIN POTENTIALLY EXPLOSIVE ATMOSPHERES, FOR EXAMPLE, PETROL STATIONS (SERVICE STATIONS), BLASTING AREAS ETC.
- OPERATION OF ANY RADIO TRANSMITTING EQUIPMENT, INCLUDING CELLULAR TELEPHONES, MAY INTERFERE WITH THE FUNCTIONALITY OF INADEQUATELY PROTECTED MEDICAL DEVICES. CONSULT A PHYSICIAN OR THE MANUFACTURER OF THE MEDICAL DEVICE IF YOU HAVE ANY QUESTIONS. OTHER ELECTRONIC EQUIPMENT MAY ALSO BE SUBJECT TO INTERFERENCE.
- BEFORE MAKING ANY TEST CONNECTIONS, MAKE SURE YOU HAVE SWITCHED OFF ALL EQUIPMENT.

Cautions

- Servicing and alignment must be undertaken by qualified personnel only.
- Ensure all work is carried out at an anti-static workstation and that an anti-static wrist strap is worn.
- Ensure solder, wire, or foreign matter does not enter the telephone as damage may result.
- Use only approved components as specified in the parts list.
- Ensure all components, modules, screws and insulators are correctly re-fitted after servicing and alignment.
- Ensure all cables and wires are repositioned correctly.
- Never test a mobile phone WCDMA transmitter with full Tx power, if there is no possibility to perform the measurements in a good performance RF-shielded room. Even low power WCDMA transmitters may disturb nearby WCDMA networks and cause problems to 3G cellular phone communication in a wide area.
- During testing never activate the GSM or WCDMA transmitter without a proper antenna load, otherwise GSM or WCDMA PA may be damaged.

For your safety

QUALIFIED SERVICE

Only qualified personnel may install or repair phone equipment.

ACCESSORIES AND BATTERIES

Use only approved accessories and batteries. Do not connect incompatible products.

CONNECTING TO OTHER DEVICES

When connecting to any other device, read its user's guide for detailed safety instructions. Do not connect incompatible products.

Care and maintenance

This product is of superior design and craftsmanship and should be treated with care. The suggestions below will help you to fulfil any warranty obligations and to enjoy this product for many years.

- Keep the phone and all its parts and accessories out of the reach of small children.
- Keep the phone dry. Precipitation, humidity and all types of liquids or moisture can contain minerals that will corrode electronic circuits.
- Do not use or store the phone in dusty, dirty areas. Its moving parts can be damaged.
- Do not store the phone in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.
- Do not store the phone in cold areas. When it warms up (to its normal temperature), moisture can form inside, which may damage electronic circuit boards.
- Do not drop, knock or shake the phone. Rough handling can break internal circuit boards.
- Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the phone.
- Do not paint the phone. Paint can clog the moving parts and prevent proper operation.
- Use only the supplied or an approved replacement antenna. Unauthorised antennas, modifications or attachments could damage the phone and may violate regulations governing radio devices.

All of the above suggestions apply equally to the product, battery, charger or any accessory.

ESD protection

Nokia requires that service points have sufficient ESD protection (against static electricity) when servicing the phone.

Any product of which the covers are removed must be handled with ESD protection. The SIM card can be replaced without ESD protection if the product is otherwise ready for use.

To replace the covers ESD protection must be applied.

All electronic parts of the product are susceptible to ESD. Resistors, too, can be damaged by static electricity discharge.

All ESD sensitive parts must be packed in metallized protective bags during shipping and handling outside any ESD Protected Area (EPA).

Every repair action involving opening the product or handling the product components must be done under ESD protection.

ESD protected spare part packages MUST NOT be opened/closed out of an ESD Protected Area.

For more information and local requirements about ESD protection and ESD Protected Area, contact your local Nokia After Market Services representative.

Battery information

> **Note:** A new battery's full performance is achieved only after two or three complete charge and discharge cycles!

The battery can be charged and discharged hundreds of times but it will eventually wear out. When the operating time (talk-time and standby time) is noticeably shorter than normal, it is time to buy a new battery.

Use only batteries approved by the phone manufacturer and recharge the battery only with the chargers approved by the manufacturer. Unplug the charger when not in use. Do not leave the battery connected to a charger for longer than a week, since overcharging may shorten its lifetime. If left unused a fully charged battery will discharge itself over time.

Temperature extremes can affect the ability of your battery to charge.

For good operation times with Ni-Cd/NiMh batteries, discharge the battery from time to time by leaving the product switched on until it turns itself off (or by using the battery discharge facility of any approved accessory available for the product). Do not attempt to discharge the battery by any other means.

Use the battery only for its intended purpose.

Never use any charger or battery which is damaged.

Do not short-circuit the battery. Accidental short-circuiting can occur when a metallic object (coin, clip or pen) causes direct connection of the + and - terminals of the battery (metal strips on the battery) for example when you carry a spare battery in your pocket or purse. Short-circuiting the terminals may damage the battery or the connecting object.

Leaving the battery in hot or cold places, such as in a closed car in summer or winter conditions, will reduce the capacity and lifetime of the battery. Always try to keep the battery between 15°C and 25°C (59°F and 77°F). A phone with a hot or cold battery may temporarily not work, even when the battery is fully charged. Batteries' performance is particularly limited in temperatures well below freezing.

Do not dispose of batteries in a fire!

Dispose of batteries according to local regulations (e.g. recycling). Do not dispose as household waste.

Company Policy

Our policy is of continuous development; details of all technical modifications will be included with service bulletins.

While every endeavour has been made to ensure the accuracy of this document, some errors may exist. If any errors are found by the reader, NOKIA MOBILE PHONES Business Group should be notified in writing/e-mail.

Please state:

- Title of the Document + Issue Number/Date of publication
- Latest Amendment Number (if applicable)
- Page(s) and/or Figure(s) in error

Please send to:

NOKIA CORPORATION
Nokia Mobile Phones Business Group
Nokia Customer Care
PO Box 86
FIN-24101 SALO
Finland
E-mail: Service.Manuals@nokia.com

(This page left intentionally blank.)

Nokia 6280 Service Manual Structure

1 General information
2 Parts and layouts
3 Service Software Instructions
4 Service Tools and Service Concepts
5 Disassembly and reassembly instructions
6 BB Troubleshooting and Manual Tuning Guide
7 Camera Module Troubleshooting
8 RF troubleshooting
9 System Module
10 Schematics
Glossary

(This page left intentionally blank.)

1 — General information

(This page left intentionally blank.)

Table of Contents

Product selection........1–5
Phone features........1–5
Mobile enhancements........1–6
Technical specifications........1–8
General specifications........1–8
Main RF characteristics for triple GSM band and WCDMA band phones (Europe)........1–8
Battery endurance........1–9
Environmental conditions........1–9

List of Tables

Table 1 Audio........1–6
Table 2 Car........1–7
Table 3 Data........1–7
Table 4 Imaging........1–7
Table 5 Messaging........1–7
Table 6 Power........1–8

List of Figures

Figure 1 RM-78 product picture........1–5

(This page left intentionally blank.)

Product selection

Nokia RM-78 is a WCDMA/GSM dual mode phone, supporting WCDMA 2100 (UMTS) and EGSM 900/ 1800/1900 bands.

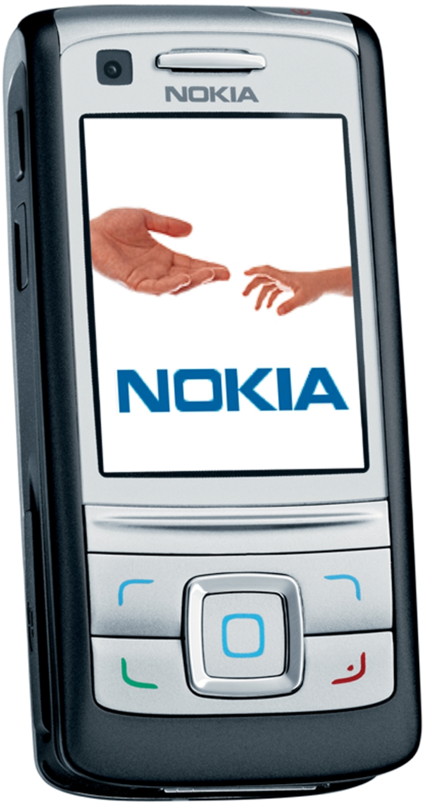


Figure 1 RM-78 product picture

Phone features

Display and keypad

- Integrated Flash LED
- Large high resolution QVGA color display (320x240 pixels) with 262k colors 2.2" (33.48mm x 44.64mm) display
- 2MPix camera with integrated flash and mirror, VGA camera for Video call
- Landscape mode for image capturing
- 6 MB flash for user data and SD Mini card (hot swap)
- 5-way scroll, soft keys, send key, end key and center select
- PoC (Push To Talk) key on the side
- Side volume key with camera zoom functionality
- Dedicated key for camera application

Bearers and transport

- WCDMA 2100 and GSM Tri-band 900/1800/1900
- EDGE release 99: MSC 10 (RX+TX 4+1, 3+2)

- GPRS: MSC 10 (RX+TX: 4+1, 3+2, class B & C)
- HSCSD, CSD
- Speech codec support for FR, EFR, AMR, WB-AMR

Software platform

- Nokia series 40

Connectivity

- USB through Pop-Port™ connector
- Bluetooth 1.2
- IrDA
- 2 mm charger plug

User Interface

- SMS, MMS
- E-mail client with support for attachment
- WAP 2.0, XHTML browser over HTTP/TCP/IP stack
- Video Call and Video Ringtones
- Video streaming and recording
- Video, MP3, AAC, eAAC+ and 64 poly ringing tones
- Push to Talk
- Visual Radio
- Logs (last calls , timers and history list)
- Java & APIs: MIDP2.0, JSR139 (CLDC1.1), JSR75 (file connection and PIM), JSR135, JSR184 (3D), JSR82 (BT)
- Stereo Music Player supporting MP3, MP4, eAAC+, AAC
- Data Transfer

Sales package

- Transceiver RM-78
- 64 Mbyte mini SD card
- Classic Stereo Headset HS-23
- CA-53 data-cable
- BP-6M Li-Ion 970 mAh Battery
- AC-4 Charger (2 mm plug)
- Booklet - Users manual
- CD-ROM

Mobile enhancements

Table 1 Audio

Type	Description
HDB-4	Boom headset
HDS-3	Stereo headset

Type	Description
HDW-3	Wireless headset
HS-3	Fashion headset
HS-4W	Wireless boom headset
HS-5	Mono headset
HS-8	Activity headset
HS-13	Wireless image headset
HS-21W	Wireless clip-on headset
HS-23	Classic stereo headset
HS-37W	Wireless headset
LPS-4	Loopset
MD-1	Music stand

Table 2 Car

Type	Description
BHF-3	Headrest handsfree
CK-1W	Wireless car kit
CK-7W	Advanced car kit (sales pack) (EURO 1)
CK-10	Car kit
CR-43	Mobile holder
HF-3	Basic handsfree
HF-6W	Plug-in car handsfree

Table 3 Data

Type	Description
CA-53	Connectivity cable
	PC suite

Table 4 Imaging

Type Description	Description
PT-6	Nokia remote camera

Table 5 Messaging

Type	Description
SU-1B	Nokia digital pen (Eur/US)

Table 6 Power

Type	Description
AC-3	Compact charger
AC-4	Travel charger
AC-44	Charger adapter
BP-6M	Battery Li-on
DC-4	Mobile charger

Technical specifications

General specifications

Unit	Dimension (mm)	Weight (g)	Volume (cc)
Transceiver with BP-6M 970mAh Li-Ion battery pack	100x46x21	115	91

Main RF characteristics for triple GSM band and WCDMA band phones (Europe)

Parameter	Unit
Cellular system	GSM/EGSM900,GSM1800/1900 WCDMA2100
Rx frequency band	EGSM900: 925 - 935 MHz
	GSM900: 935 - 960 MHz
	GSM1800: 1805 - 1880 MHz
	GSM1900: 1930 - 1990 MHz
	WCDMA: 2110- 2170 MHz
Tx frequency band	EGSM900: 880 - 890 MHz
	GSM900: 890 - 915 MHz
	GSM1800: 1710 - 1785 MHz
	GSM1900: 1850 - 1910 MHz
	WCDMA: 1920 - 1980 MHz
Output power	GSM900: +5 ... +32.5 dBm
	GSM1800: +0 ... +30 dBm
	GSM1900: +0 ... +30 dBm
	WCDMA2100: 0 ...+24 dBm

Parameter	Unit
Number of RF channels	GSM900: 125
	GSM1800: 375
	GSM1900: 300
	WCDMA2100: 8
Channel spacing	GSM 200 KHz WCDMA 4.8 MHz
Number of Tx power levels	GSM900: 15
	GSM1800: 16
	GSM1900: 16
	WCDMA2100: 12

Battery endurance

Nokia measurements of operation times

Talk time	
Battery: BP-6M 970mAh	In GSM Up to 3 hours in GSM and up to 2.5 hours in WCDMA

Standby time	
Battery: BP-6M 970mAh	Up to 250 hours in GSM and 200 in WCDMA

Note: Variation in operation times will occur depending on SIM card, network settings and usage. Talk time is increased by up to 30% if half rate is active and reduced by 5% if enhanced full rate is active.

Environmental conditions

Environmental condition	Ambient temperature	Notes
Normal operation	15 ºC ... +55 ºC	Specifications fulfilled
Reduced performance	55 ºC ... +70 ºC	Operational only for short periods
Intermittent or no operation	-40 ºC ... -15 ºC and +70 ºC ... +85ºC	Operation not guaranteed but an attempt to operate will not damage the phone
No operation or storage	<-40 ºC and >+85 ºC	No storage. An attempt to operate may cause permanent damage
Charging allowed	-15 ºC ... +55 ºC	
Long term storage conditions	0 ºC ... +85 ºC	

Environmental condition	Ambient temperature	Notes
Humidity and water resistance		Relative humidity range is 5 to 95%. Condensed or dripping water may cause intermittent malfunctions. Protection against dripping water has to be implemented in (enclosure) mechanics. Continuous dampness will cause permanent damage to the module.

2 — Parts and layouts

(This page left intentionally blank.)

Table of Contents

Exploded view....2–5
Mechanical parts list....2–6
Spare parts overview....2–8
SWAP phones....2–9
Component parts list....2–9
Component layouts....2–20

List of Tables

Table 7 Mechanical parts list....2–6
Table 8 SWAP phones for RM-78....2–9
Table 9 Component parts list (Build 1mda_05a)....2–9

List of Figures

Figure 2 Exploded view....2–5
Figure 3 Spare parts overview....2–8
Figure 4 Component layout, RM-78, 1mda_05a, bottom....2–21
Figure 5 Component layout, RM-78, 1mda_05a top....2–21

(This page left intentionally blank.)

Exploded view

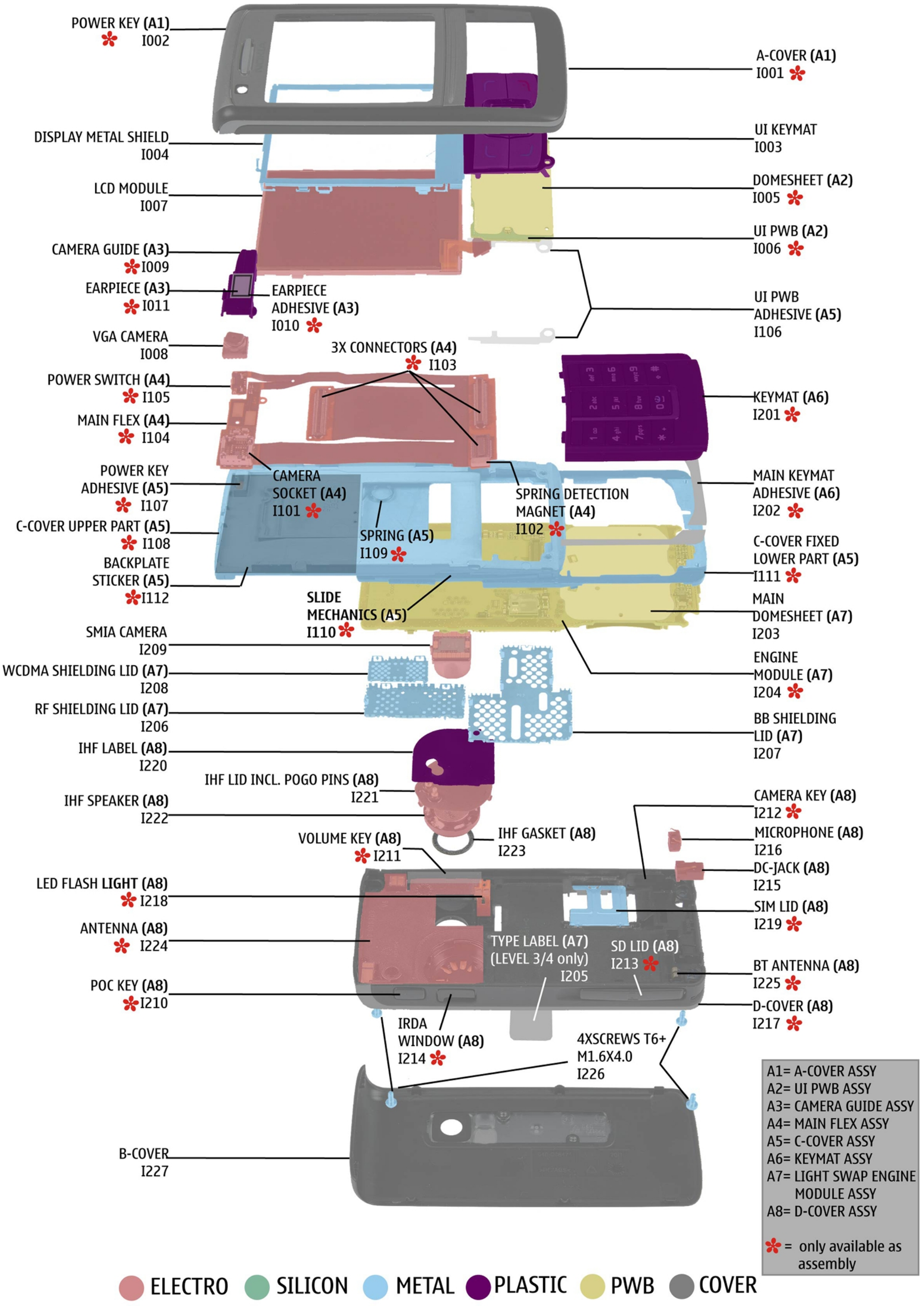

POWER KEY (A1) ✻ I002
A-COVER (A1) I001 ✻
DISPLAY METAL SHIELD I004
UI KEYMAT I003
LCD MODULE I007
DOMESHEET (A2) I005 ✻
CAMERA GUIDE (A3) ✻ I009
UI PWB (A2) I006 ✻
EARPIECE (A3) ✻ I011
EARPIECE ADHESIVE (A3) I010 ✻
UI PWB ADHESIVE (A5) I106
VGA CAMERA I008
3X CONNECTORS (A4) ✻ I103
POWER SWITCH (A4) ✻ I105
KEYMAT (A6) I201 ✻
MAIN FLEX (A4) ✻ I104
POWER KEY ADHESIVE (A5) ✻ I107
CAMERA SOCKET (A4) I101 ✻
SPRING DETECTION MAGNET (A4) I102 ✻
MAIN KEYMAT ADHESIVE (A6) I202 ✻
C-COVER UPPER PART (A5) ✻ I108
SPRING (A5) I109 ✻
C-COVER FIXED LOWER PART (A5) I111 ✻
BACKPLATE STICKER (A5) ✻ I112
SLIDE MECHANICS (A5) I110 ✻
MAIN DOMESHEET (A7) I203
SMIA CAMERA I209
ENGINE MODULE (A7) I204 ✻
WCDMA SHIELDING LID (A7) I208
RF SHIELDING LID (A7) I206
BB SHIELDING LID (A7) I207
IHF LABEL (A8) I220
IHF LID INCL. POGO PINS (A8) I221
IHF SPEAKER (A8) I222
CAMERA KEY (A8) I212 ✻
VOLUME KEY (A8) ✻ I211
IHF GASKET (A8) I223
MICROPHONE (A8) I216
DC-JACK (A8) I215
LED FLASH LIGHT (A8) ✻ I218
SIM LID (A8) I219 ✻
ANTENNA (A8) ✻ I224
TYPE LABEL (A7) (LEVEL 3/4 only) I205
SD LID (A8) I213 ✻
BT ANTENNA (A8) I225 ✻
POC KEY (A8) ✻ I210
D-COVER (A8) I217 ✻
IRDA WINDOW (A8) I214 ✻
4XSCREWS T6+ M1.6X4.0 I226
B-COVER I227
A1= A-COVER ASSY
A2= UI PWB ASSY
A3= CAMERA GUIDE ASSY
A4= MAIN FLEX ASSY
A5= C-COVER ASSY
A6= KEYMAT ASSY
A7= LIGHT SWAP ENGINE MODULE ASSY
A8= D-COVER ASSY
✻ = only available as assembly
● ELECTRO
● SILICON
● METAL
● PLASTIC
● PWB
● COVER

Figure 2 Exploded view

Mechanical parts list

Table 7 Mechanical parts list

ITEM/CIRCUIT REF.	QTY	PART NAME
* = not available as spare part		
	1	**A-cover assembly**
I001*	1	A-cover
I002*	1	Powerkey
I003	1	UI Keymat
I004	1	Display metal shield
	1	**UI PWB assembly**
I005*	1	Domesheet
I006*	1	UI PWB
I007	1	LCD module
I008	1	VGA camera
	1	**Camera guide assembly**
I009*	1	Camera guide
I010*	1	Earpiece adhesive
I011*	1	Earpiece
	1	**Main flex assembly**
I101*	1	Camera socket
I102*	1	Spring detection magnet
I103*	3	Connector
I104*	1	Main flex
I105*	1	Power switch
	1	**C-cover assembly**
I106	1	UI PWB adhesive
I107*	1	Power key adhesive
I108*	1	C-cover upper part
I109*	1	Spring
I110*	1	Slide mechanics
I111*	1	C-cover fixed lower part
I112*	1	Backplate sticker
	1	**Keymat assembly**

ITEM/CIRCUIT REF.	QTY	PART NAME
I201*	1	Keymat
I202*	1	Main keymat adhesive
	1	**Light SWAP engine module assembly**
I203	1	Main domesheet
I204*	1	Engine module
I205	1	Type label
I206	1	RF shielding lid
I207	1	BB shielding lid
I208	1	WCDMA shielding lid
I209	1	SMIA camera
	1	**D-cover assembly**
I210*	1	POC key
I211*	1	Volume key
I212*	1	Camera key
I213*	1	SD lid
I214*	1	IRDA window
I215	1	DC-jack
I216	1	Microphone
I217*	1	D-cover
I218*	1	LED flash light
I219*	1	SIM lid
I220	1	IHF label
I221	1	IHF lid including Pogopins
I222	1	IHF speaker
I223	1	IHF gasket
I224*	1	Antenna
I225*	1	BT Antenna
I226	4	Screws T6+
I227	1	B-cover

Spare parts overview

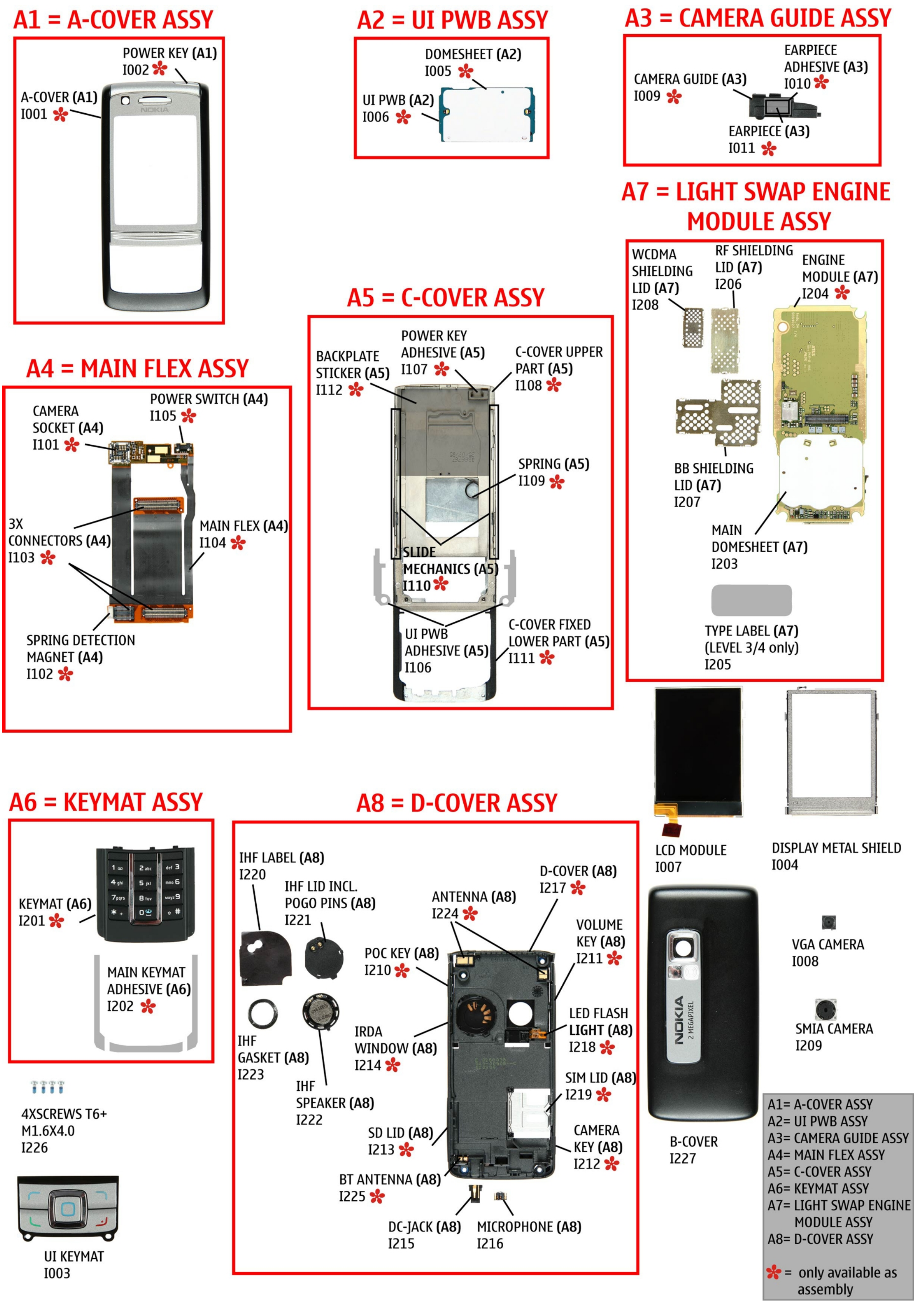

A1 = A-COVER ASSY
POWER KEY (A1) I002 ✽
A-COVER (A1) I001 ✽
A2 = UI PWB ASSY
DOMESHEET (A2) I005 ✽
UI PWB (A2) I006 ✽
A3 = CAMERA GUIDE ASSY
CAMERA GUIDE (A3) I009 ✽
EARPIECE ADHESIVE (A3) I010 ✽
EARPIECE (A3) I011 ✽
A7 = LIGHT SWAP ENGINE MODULE ASSY
WCDMA SHIELDING LID (A7) I208
RF SHIELDING LID (A7) I206
ENGINE MODULE (A7) I204 ✽
BB SHIELDING LID (A7) I207
MAIN DOMESHEET (A7) I203
TYPE LABEL (A7) (LEVEL 3/4 only) I205
A5 = C-COVER ASSY
BACKPLATE STICKER (A5) I112 ✽
POWER KEY ADHESIVE (A5) I107 ✽
C-COVER UPPER PART (A5) I108 ✽
SPRING (A5) I109 ✽
SLIDE MECHANICS (A5) I110 ✽
UI PWB ADHESIVE (A5) I106
C-COVER FIXED LOWER PART (A5) I111 ✽
A4 = MAIN FLEX ASSY
CAMERA SOCKET (A4) I101 ✽
POWER SWITCH (A4) I105 ✽
3X CONNECTORS (A4) I103 ✽
MAIN FLEX (A4) I104 ✽
SPRING DETECTION MAGNET (A4) I102 ✽
LCD MODULE I007
DISPLAY METAL SHIELD I004
A6 = KEYMAT ASSY
KEYMAT (A6) I201 ✽
MAIN KEYMAT ADHESIVE (A6) I202 ✽
4XSCREWS T6+ M1.6X4.0 I226
UI KEYMAT I003
A8 = D-COVER ASSY
IHF LABEL (A8) I220
IHF LID INCL. POGO PINS (A8) I221
ANTENNA (A8) I224 ✽
D-COVER (A8) I217 ✽
VOLUME KEY (A8) I211 ✽
POC KEY (A8) I210 ✽
IHF GASKET (A8) I223
IRDA WINDOW (A8) I214 ✽
LED FLASH LIGHT (A8) I218 ✽
IHF SPEAKER (A8) I222
SIM LID (A8) I219 ✽
SD LID (A8) I213 ✽
CAMERA KEY (A8) I212 ✽
BT ANTENNA (A8) I225 ✽
DC-JACK (A8) I215
MICROPHONE (A8) I216
B-COVER I227
VGA CAMERA I008
SMIA CAMERA I209
A1= A-COVER ASSY
A2= UI PWB ASSY
A3= CAMERA GUIDE ASSY
A4= MAIN FLEX ASSY
A5= C-COVER ASSY
A6= KEYMAT ASSY
A7= LIGHT SWAP ENGINE MODULE ASSY
A8= D-COVER ASSY
✽ = only available as assembly

Figure 3 Spare parts overview

SWAP phones

Table 8 SWAP phones for RM-78

SWAP phones for RM-78
N6280 RM-78 SWAP ENGINE C.BLACK E&A
N6280 RM-78 SWAP ENGINE C.BLACK SA
N6280 RM-78 SWAP ENGINE C.BLACK FR
N6280 RM-78 SWAP ENGINE C.BLACK TR
N6280 RM-78 SWAP ENGINE C.BLACK RU
N6280 RM-78 SWAP ENGINE C.BLACK UA
N6280 RM-78 SWAP ENGINE C.BLACK HE
N6280 RM-78 SWAP ENGINE C.BLACK AR
N6280 RM-78 SWAP ENGINE C.BLACK GR
N6280 RM-78 SWAP ENGINE G.GREY E&A
N6280 RM-78 SWAP ENGINE G.GREY SA
N6280 RM-78 SWAP ENGINE G.GREY FR
N6280 RM-78 SWAP ENGINE G.GREY TR
N6280 RM-78 SWAP ENGINE G.GREY RU
N6280 RM-78 SWAP ENGINE G.GREY UA
N6280 RM-78 SWAP ENGINE G.GREY HE
N6280 RM-78 SWAP ENGINE G.GREY AR
N6280 RM-78 SWAP ENGINE G.GREY GR

Component parts list

Table 9 Component parts list (Build 1mda_05a)

Item	Name	PWB Side	XY.	Value	
B2200	CRYSTAL 32.768KHZ +/-30PPM 12.5PF	T	J6	32.768K Hz	-
C1000	CHIPCAP X5R 1U K 6V3 0603	T	N8	1u	6V3
C1001	CHIPCAP X5R 100N K 10V 0402	T	N8	100n	10V
C1008	CHIPCAP X5R 1U K 6V3 0603	T	M5	1u	6V3
C1009	CHIPCAP NP0 27P J 50V 0402	T	O8	27p	50V
C1010	CHIPCAP NP0 27P J 50V 0402	T	O8	27p	50V
C1060	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	T	N8	2x1u	6V3
C2000	CHIPCAP NP0 27P J 50V 0402	B	A3	27p	50V

Item	Name	PWB Side	XY.	Value	
C2001	CHIPCAP X5R 1U K 25V 0603	B	B2	1u	25V
C2002	CHIPCAP X7R 1N0 K 50V 0402	B	B5	1n0	50V
C2003	CHIPCAP FEEDTHRU 100N M 25V 0805	B	B2	100n	25V
C2004	CHIPCAP X5R 4U7 K 6.3V 0603	B	B4	4u7	6V3
C2005	CHIPCAP X7R 33N K 10V 0402	B	A4	33n	10V
C2007	CHIPCAP X7R 10N K 16V 0402	B	A7	10	16V
C2008	CHIPCAP X7R 10N K 16V 0402	B	A7	10	16V
C2009	CHIPCAP X7R 10N K 16V 0402	B	A6	10	16V
C2010	CHIPCAP X7R 10N K 16V 0402	B	A6	10	16V
C2011	CHIPCAP NP0 10P J 50V 0402	B	B7	10p	50V
C2012	CHIPCAP NP0 10P J 50V 0402	B	B7	10p	50V
C2013	CHIPCAP NP0 10P J 50V 0402	B	B6	10p	50V
C2014	CHIPCAP NP0 10P J 50V 0402	B	B6	10p	50V
C2015	CHIPCAP NP0 270P J 50V 0402	B	A3	270p	50V
C2016	CHIPCAP X7R 33N K 10V 0402	B	A4	33n	10V
C2070	CHIPCAP NP0 27P J 50V 0402	T	M6	27p	50V
C2071	CHIPCAP NP0 27P J 50V 0402	T	E6	27p	50V
C2100	CHIPCAP X7R 33N K 10V 0402	T	I6	33n	10V
C2101	CHIPCAP X7R 33N K 10V 0402	T	H6	33n	10V
C2102	CHIPCAP X5R 4U7 K 6.3V 0603	T	I6	4u7	6V3
C2105	CHIPCAP X7R 1N0 K 50V 0402	T	I8	1n0	50V
C2106	CHIPCAP X7R 1N0 K 50V 0402	T	I8	1n0	50V
C2107	CHIPCAP X7R 1N0 K 50V 0402	T	I8	1n0	50V
C2108	CHIPCAP X7R 1N0 K 50V 0402	T	C6	1n0	50V
C2109	CHIPCAP X7R 1N0 K 50V 0402	T	I8	1n0	50V
C2110	CHIPCAP X7R 1N0 K 50V 0402	T	I8	1n0	50V
C2200	CHIPCAP X5R 1U K 6V3 0402	T	I7	1u	6V3
C2201	CHIPCAP X5R 1U K 6V3 0603	T	K6	1u	6V3
C2202	CHIPCAP X7R 1N0 K 50V 0402	T	J6	1n0	50V
C2203	CHIPCAP X7R 1N0 K 50V 0402	T	J6	1n0	50V
C2204	CHIPCAP X7R 1N0 K 50V 0402	T	I6	1n0	50V
C2205	CHIPCAP X7R 1N0 K 50V 0402	T	I6	1n0	50V
C2206	CHIPCAP X7R 1N0 K 50V 0402	T	I6	1n0	50V
C2207	CHIPCAP X7R 1N0 K 50V 0402	T	K6	1n0	50V

Item	Name	PWB Side	XY.	Value	
C2208	CHIPCAP NP0 27P J 50V 0402	T	J6	27p	50V
C2209	CHIPCAP NP0 22P J 50V 0402	T	K6	22p	50V
C2210	CHIPCAP X5R 1U K 16V 0603	T	K8	1u	16V
C2211	CHIPCAP X5R 4U7 K 10V 0805	T	J8	4u7	10V
C2212	CHIPCAP X5R 1U K 6V3 0603	T	K7	1u	6V3
C2215	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	T	K8	2x1u	6V3
C2217	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	T	K5	2x1u	6V3
C2220	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	T	J8	2x1u	6V3
C2221	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	T	J8	2x1u	6V3
C2222	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	T	K6	2x1u	6V3
C2223	CHIPCAP X7R 10N K 16V 0402	T	I7	10	16V
C2224	CHIPCAP X7R 10N K 16V 0402	T	I7	10	16V
C2225	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	T	K8	2x1u	6V3
C2226	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	T	K8	2x1u	6V3
C2229	CHIPCAP NP0 22P J 50V 0402	T	J6	22p	50V
C2230	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	T	K7	2x1u	6V3
C2231	CHIPCAP X5R 10U M 6V3 0805	T	I7	10u	6V3
C2232	CHIPCAP NP0 27P J 50V 0402	T	K7	27p	50V
C2233	CHIPCAP NP0 56P J 50V 0402	T	K7	56p	50V
C2236	CHIPCAP X7R 1N0 K 50V 0402	T	K7	1n0	50V
C2300	CHIPCAP X7R 10N K 16V 0402	T	H2	10	16V
C2301	CHIPCAP X5R 22U M 6V3 0805	T	H1	22u	6V3
C2302	CHIPCAP X5R 22U M 6V3 0805	T	H2	22u	6V3
C2303	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	T	I5	2x1u	6V3
C2304	CHIPCAP X7R 10N K 16V 0402	T	G4	10	16V
C2305	CHIPCAP NP0 27P J 50V 0402	T	G4	27p	50V
C2307	CHIP ARRAY X5R 2X1U (2x1U2) K 6V3 0405	T	I5	2x1u	6V3
C2309	CHIPCAP X5R 22U M 6V3 0805	T	H2	22u	6V3
C2313	CHIPCAP X5R 1U K 6V3 0603	T	I4	1u	6V3
C2405	CHIPCAP X5R 1U K 6V3 0603	B	J8	1u	6V3
C2406	CHIPCAP X5R 1U K 6V3 0603	B	J8	1u	6V3
C2430	CHIPCAP NP0 27P J 50V 0402	B	L2	27p	50V
C2500	CHIPCAP X5R 4U7 K 6.3V 0603	T	F6	4u7	6V3
C2501	CHIPCAP X5R 100N M 16V 0402	T	E6	100n	16V

Item	Name	PWB Side	XY.	Value	
C2502	CHIPCAP NP0 27P J 50V 0402	T	E6	27p	50V
C2503	CHIPCAP X5R 22U M 6V3 0805	T	G7	22u	6V3
C2504	CHIPCAP X5R 1U K 25V 0603	T	F6	1u	25V
C2530	CHIPCAP X5R 22U M 6V3 0805	B	M8	22u	6V3
C2531	CHIPCAP X5R 22U M 6V3 0805	B	M8	22u	6V3
C2532	CHIPCAP X5R 22U M 6V3 0805	B	L8	22u	6V3
C2534	CHIPCAP NP0 27P J 50V 0402	T	L8	27p	50V
C2535	CHIPCAP X7R 1N0 K 50V 0402	B	K8	1n0	50V
C2537	CHIPCAP X5R 22U M 6V3 0805	B	M8	22u	6V3
C2600	CHIPCAP X5R 4U7 K 10V 0805	T	P1	4u7	10V
C2601	CHIPCAP NP0 22P J 50V 0402	T	N1	22p	50V
C2602	CHIPCAP X5R 100N K 10V 0402	T	N1	100n	10V
C2603	CHIPCAP X5R 100N K 10V 0402	T	O1	100n	10V
C2700	CHIPCAP X5R 100N K 10V 0402	T	G6	100n	10V
C2701	CHIPCAP NP0 27P J 50V 0402	T	G6	27p	50V
C2702	CHIPCAP NP0 27P J 50V 0402	T	G6	27p	50V
C2703	CHIPCAP NP0 27P J 50V 0402	T	H6	27p	50V
C2704	CHIPCAP NP0 27P J 50V 0402	T	G6	27p	50V
C2800	CHIPCAP X5R 100N K 10V 0402	T	L4	100n	10V
C2801	CHIPCAP X5R 100N K 10V 0402	T	K1	100n	10V
C2802	CHIPCAP X5R 100N K 10V 0402	T	L4	100n	10V
C2803	CHIPCAP X5R 100N K 10V 0402	T	K1	100n	10V
C2804	CHIPCAP X5R 100N K 10V 0402	T	M1	100n	10V
C2805	CHIPCAP X5R 100N K 10V 0402	T	J2	100n	10V
C2806	CHIPCAP X5R 100N K 10V 0402	T	J3	100n	10V
C2807	CHIPCAP X5R 1U K 6V3 0603	T	J1	1u	6V3
C2808	CHIPCAP X5R 100N K 10V 0402	T	L1	100n	10V
C2809	CHIPCAP X5R 100N K 10V 0402	T	L1	100n	10V
C2810	CHIPCAP X5R 100N K 10V 0402	T	M1	100n	10V
C2811	CHIPCAP X5R 100N K 10V 0402	T	M1	100n	10V
C2812	CHIPCAP X5R 100N K 10V 0402	T	K4	100n	10V
C2813	CHIPCAP X5R 100N K 10V 0402	T	L4	100n	10V
C2814	CHIPCAP X5R 100N K 10V 0402	T	J2	100n	10V
C2815	CHIPCAP X7R 10N K 16V 0402	T	K1	10	16V

Item	Name	PWB Side	XY.	Value	
C2816	CHIPCAP X5R 100N K 10V 0402	T	L4	100n	10V
C2819	CHIPCAP NP0 27P J 50V 0402	T	M1	27p	50V
C3000	CHIPCAP X5R 100N M 16V 0402	T	I4	100n	16V
C3001	CHIPCAP X7R 10N K 16V 0402	T	I4	10	16V
C3002	CHIPCAP X5R 220N K 6.3V 0402	T	I1	220n	6V3
C3003	CHIPCAP X7R 10N K 16V 0402	T	I1	10	16V
C3005	CHIPCAP X7R 10N K 16V 0402	T	J4	10	16V
C3006	CHIPCAP X7R 10N K 16V 0402	T	J4	10	16V
C3007	CHIPCAP X5R 220N K 6.3V 0402	T	J4	220n	6V3
C3008	CHIPCAP X5R 220N K 6.3V 0402	T	K4	220n	6V3
C3009	CHIPCAP X7R 10N K 16V 0402	T	K4	10	16V
C3100	CHIPCAP NP0 27P J 50V 0402	T	L1	27p	50V
C3200	CHIPCAP X5R 100N K 10V 0402	T	C7	100n	10V
C3201	CHIPCAP X5R 1U K 6V3 0603	T	D7	1u	6V3
C3202	CHIPCAP X7R 10N K 16V 0402	T	E7	10	16V
C3203	CHIPCAP X5R 1U K 6V3 0603	T	D7	1u	6V3
C3204	CHIPCAP X5R 100N K 10V 0402	T	G5	100n	10V
C3310	CHIPCAP NP0 27P J 50V 0402	B	J4	27p	50V
C3311	CHIPCAP NP0 27P J 50V 0402	B	J4	27p	50V
C3312	CHIPCAP NP0 27P J 50V 0402	B	K4	27p	50V
C3313	CHIPCAP NP0 27P J 50V 0402	B	K5	27p	50V
C3314	CHIPCAP NP0 27P J 50V 0402	B	J5	27p	50V
C3315	CHIPCAP NP0 27P J 50V 0402	B	J5	27p	50V
C463	CHIPCAP X5R 220N K 6.3V 0402	T	J5	220n	6V3
C466	CHIPCAP X7R 10N K 16V 0402	T	J5	10	16V
C6000	CHIPCAP X5R 100N M 16V 0402	B	J3	100n	16V
C6001	CHIPCAP X5R 100N M 16V 0402	B	K3	100n	16V
C6002	CHIPCAP X5R 1U K 6V3 0603	B	I2	1u	6V3
C6003	CHIPCAP X5R 1U K 6V3 0603	B	K2	1u	6V3
C6004	CHIPCAP X5R 100N M 16V 0402	B	I2	100n	16V
C6005	CHIPCAP X5R 100N M 16V 0402	B	K2	100n	16V
C6010	CHIPCAP NP0 4P7 C 50V 0402	B	K2	4p7	50V
C6011	CHIPCAP NP0 5P6 C 50V 0402	B	K3	5p6	50V
C6050	CHIPCAP X5R 1U K 6V3 0603	B	I3	1u	6V3

Item	Name	PWB Side	XY.	Value	
C6051	CHIPCAP X5R 1U K 6V3 0603	B	J3	1u	6V3
C6052	CHIPCAP NP0 15P J 50V 0402	B	I3	15p	50V
C7500	CHIPCAP X5R 4U7 K 6.3V 0603	T	P3	4u7	6V3
C7501	CHIPCAP X5R 4U7 K 6.3V 0603	T	O4	4u7	6V3
C7502	CHIPCAP X5R 4U7 K 6.3V 0603	T	O5	4u7	6V3
C7503	CHIPCAP X5R 4U7 K 6.3V 0603	T	P3	4u7	6V3
C7504	CHIPCAP X7R 3N9 J 50V 0402	T	N4	3n9	50V
C7505	CHIPCAP X7R 10N K 16V 0402	T	N4	10	16V
C7506	CHIPCAP X7R 1N0 J 50V 0402	T	O3	1n0	50V
C7507	CHIPCAP X5R 100N M 16V 0402	T	Q3	100n	16V
C7508	CHIPCAP NP0 10P J 50V 0402	T	N3	10p	50V
C7509	CHIPCAP X5R 100N M 16V 0402	T	N3	100n	16V
C7510	CHIPCAP NP0 470P J 6V3 0402	T	N4	470p	6V3
C7512	CHIPCAP NP0 2N2 G 16V 0603	T	N4	2n2	16V
C7514	CHIPCAP NP0 2P7 C 50V 0402	T	Q4	2p7	50V
C7515	CHIPCAP NP0 3P3 C 50V 0402	T	Q4	3p3	50V
C7516	CHIPCAP NP0 0P5 C 50V 0402	T	N3	0p5	50V
C7521	CHIPCAP X5R 4U7 K 6.3V 0603	T	S5	4u7	6V3
C7541	CHIPCAP X5R 4U7 K 6.3V 0603	T	S6	4u7	6V3
C7542	CHIPCAP X5R 4U7 K 6.3V 0603	T	S6	4u7	6V3
C7543	CHIPCAP X5R 4U7 K 6.3V 0603	T	S7	4u7	6V3
C7544	CHIPCAP X7R 22N K 16V 0402	T	Q6	22n	16V
C7545	CHIPCAP NP0 10P J 50V 0402	T	Q6	10p	50V
C7547	CHIPCAP NP0 1P8 C 50V 0402	T	O5	1p8	50V
C7597	CHIPTCAP 150U M 10V 6X3.2X1.5	T	N2	150u	10V
C8000	CHIPCAP NP0 HQ 1P5 B 25V 0402	T	Q2	1p5	25V
D3000	sdram 8MX16 1.8/1.8v WBGA60 PBFREE	T	J5	-	-
D3001	FLASH 16MX16 1.8/1.8V FBGA44 PBFREE	T	I2	-	-
D6000	BTHFM1.0 ES4 Module	B	J2	-	-
F2000	SM FUSE F 2.0A 32V 0603	B	A2	2.0A	32V
G2200	RTC BACKUP CAPAC 311 SIZE FOR 2.6V 4UAH	T	E8	-	-
G7500	VCTCXO 38.4 MHZ 2.5V	T	N5	38.4 MHz	2.5 V
G7501	VCO 3296-3980MHZ 4-BAND Matsushita	T	N3	3296-3980MHz	-

Item	Name	PWB Side	XY.	Value	
L1000	FERRITE BEAD 0.6R 600R/100MZ 0402	T	N8	600R/ 100Mhz	-
L1001	FERRITE BEAD 0.6R 600R/100MZ 0402	T	M5	600R/ 100Mhz	-
L2002	CHIP BEAD ARRAY 2X1000R 0405	B	A5	2x1000R /100MHz	-
L2003	CHIP BEAD ARRAY 2X1000R 0405	B	B6	2x1000R /100MHz	-
L2004	CHIP BEAD ARRAY 2X1000R 0405	B	B7	2x1000R /100MHz	-
L2006	CHIP COIL 68NH J Q12/100MHZ 0603	B	A6	68n/ 100Mhz	0
L2100	CHIP BEAD ARRAY 2X1000R 0405	B	B5	2x1000R /100MHz	-
L2101	FERR.BEAD 220R/100M 2A 0R05 0603	T	I8	220R/ 100Mhz	-
L2102	CHIP COIL 30nH J Q65/500MHz 0805	T	P2	30n	-
L2103	CHIP COIL 30nH J Q65/500MHz 0805	T	P2	30n	-
L2104	FERR.BEAD 220R/100M 2A 0R05 0603	T	I8	220R/ 100Mhz	-
L2105	FERR.BEAD 220R/100M 2A 0R05 0603	T	I8	220R/ 100Mhz	-
L2108	FERR.BEAD 220R/100M 2A 0R05 0603	T	I8	220R/ 100Mhz	-
L2202	FERR.BEAD 220R/100M 2A 0R05 0603	T	K8	220R/ 100Mhz	-
L2203	FERRITE BEAD 0.6R 600R/100MZ 0402	T	K7	600R/ 100Mhz	-
L2204	FERRITE BEAD 0.6R 600R/100MZ 0402	T	K7	600R/ 100Mhz	-
L2205	FERR.BEAD 220R/100M 2A 0R05 0603	T	I8	220R/ 100Mhz	-
L2206	FERRITE BEAD 0.6R 600R/100MZ 0402	T	K6	600R/ 100Mhz	-
L2233	FERR.BEAD 240R/100M 0.4A 0R4 0402	T	K7	240R/ 100MHz	-
L2301	FERR.BEAD 220R/100M 2A 0R05 0603	T	H2	220R/ 100Mhz	-
L2302	INDUCT WW 10U 0A65 0R35 4X4X1.2	T	H3	10u	-

Item	Name	PWB Side	XY.	Value	
L2303	FERR.BEAD 0R03 42R/100MHZ 3A 0805	T	I5	42R/1000MHz	-
L2304	FERRITE BEAD 0.6R 600R/100MZ 0402	T	I5	600R/100Mhz	-
L2400	FERRITE BEAD 0.6R 600R/100MZ 0402	B	J8	600R/100Mhz	-
L2401	FERRITE BEAD 0.6R 600R/100MZ 0402	B	J8	600R/100Mhz	-
L2500	FERR.BEAD 0R03 42R/100MHZ 3A 0805	T	F6	42R/1000MHz	-
L2530	CHOKE 4U7 0.86A 0R17 3X3X1.5	T	L7	4u7	-
L2702	CHIP COIL 39N J Q24/800MHZ 0402	T	H6	39n	-
L2703	CHIP COIL 39N J Q24/800MHZ 0402	T	H6	39n	-
L2704	CHIP COIL 39N J Q24/800MHZ 0402	T	H6	39n	-
L3200	FERRITE BEAD 0.6R 600R/100MZ 0402	T	D7	600R/100Mhz	-
L7500	FERRITE BEAD 0.6R 600R/100MZ 0402	T	O3	600R/100Mhz	-
L7520	FERRITE BEAD 0R01 28R/100MHZ 0603	T	S5	28R/100MHz	-
L7540	CHOKE 3U3 1.2A 0R15 3X3X1.5	T	S7	3u3	-
L7541	CHIP COIL 22N J Q28/800MHZ 0402	T	Q8	22n	-
L7543	CHIP COIL 3N3 +-0N3 Q28/800M 0402	T	P5	3n3	-
L8000	INDUCT WW 3N6 C 25/6000 0603	T	R2	3n6/250MHz	-
M2100	SMD VIBRA MOTOR 1.3V 90MA 9000RPM	T	B7	-	-
N1060	VREG 2.85/150MA(LP3987-2.85)USMD5	T	O8	-	-
N2430	HALL IC SWITCH SH248CSP VCC	B	M2	-	-
N2500	BUCK/BOOST CONV. REG710NA-5 SOT23-6	T	F6	-	-
N2530	DC/DC BOOST CONV. TPS61058 QFN-10	T	L8	-	-
N2600	IRDA 1.15Mbps 2.2mm RoHS	T	N1	-	-
N3200	VREG & LEVELSHIFT(LP3928)USMD16	T	D7	-	-
N6050	VREG 2.85/150MA(LP3987-2.85)USMD5	B	I3	-	-
N7500	RF SYSTEM MODULE PIHI2.22 9.0 x 9.0 x 1	T	P4	-	-
N7520	PA RF9282E6.2 GSM/EDGE 850/900/1800/1900	T	S4	-	-
N7540	PA MODULE RF9372E5,2 WCDMA 1850-1980MHz	T	R6	-	-

Item	Name	PWB Side	XY.	Value	
N7541	DC CONV SAMURAI LM3202TL NOPB revB µSMD8	T	S6	-	-
R1000	CHIPRES 0W06 100R J 0402	T	J3	100R	-
R1001	CHIPRES 0W06 100R J 0402	T	J3	100R	-
R2000	ASIP MIC W/ESD RES+CAP+ZDI BGA11	B	A4	-	-
R2001	CHIPRES 0W06 10K J 0402	B	A5	10K	-
R2002	CHIPRES 0W06 220R J 0402	B	B4	220R	-
R2003	VAR.ARRAY 2X16V 824-915MHZ 0405	B	A5	-	-
R2004	CHIPRES 0W06 33K J 0402	B	A4	33K	-
R2005	CHIPRES 0W06 10R J 0402	B	A6	10R	-
R2006	CHIPRES 0W06 10R J 0402	B	A6	10R	-
R2007	CHIPRES 0W06 10R J 0402	B	A7	10R	-
R2008	CHIPRES 0W06 10R J 0402	B	A7	10R	-
R2009	VAR.ARRAY 2X16V 824-915MHZ 0405	B	A6	-	-
R2010	VAR.ARRAY 2X16V 824-915MHZ 0405	B	A7	-	-
R2011	ASIP SILIC USB OTG / ESD BGA11	B	B3	-	-
R2012	RES NETWORK 0W06 220K/120K J 0404	B	A4	220K/ 120K	-
R2013	CHIPRES 0W06 100R J 0402	B	A3	100R	-
R2015	CHIPRES 0W06 10R J 0402	B	B4	10R	-
R2016	CHIP VARISTOR VWM14V VC50V 0402	B	B3	-	50V
R2019	CHIPRES JUMPER 0R0 0402	T	C7	0R0	-
R2020	CHIPRES 0W06 2K2 J 0402	T	D7	2K2	-
R2021	CHIPRES 0W06 1M0 J 0402	T	D7	1M0	-
R2070	NTC RES 0W1 47K J B 4050+-3% 0402	T	E6	47K	-
R2100	ASIP MIC W/ESD RES+CAP+ZDI BGA11	T	I6	-	-
R2101	CHIPRES 0W06 220R J 0402	T	I6	220R	-
R2102	CHIPRES 0W06 33K J 0402	T	I7	33K	-
R2103	VAR.ARRAY 2X16V 824-915MHZ 0405	B	B5	-	-
R2104	RES NETWORK 0W06 2X10R J 0404	T	I7	2x10R	-
R2106	VAR.ARRAY 2X16V 824-915MHZ 0405	T	P2	-	-
R2200	CHIPRES 0W06 100K J 0402	T	J6	100K	-
R2201	CHIPRES 0W06 120K J 0402	T	K6	120K	-
R2202	CHIPRES 0W06 4K7 J 0402	T	K6	4K7	-
R2203	CHIPRES 0W06 2M2 J 0402	T	J6	2M2	-

Item	Name	PWB Side	XY.	Value	
R2204	CHIPRES 0W06 4K7 J 0402	T	J6	4K7	-
R2205	CHIPRES 0W06 220R J 0402	T	I6	220R	-
R2206	CHIPRES 0W06 470R J 0402	T	I7	470R	-
R2400	CHIPRES 0W06 100K J 0402	B	I4	100K	-
R2430	CHIPRES 0W06 470K J 0402	B	M2	470K	-
R2500	CHIPRES 0W06 10K J 0402	T	F7	10K	-
R2502	CHIPRES 0W06 10K J 0402	T	E7	10K	-
R2531	CHIPRES 0W06 39K J 0402	B	K8	39K	0
R2534	CHIPRES 0W06 10K J 0402	B	K8	10K	-
R2537	CHIPRES 0W06 56K J 0402	B	K8	56K	-
R2538	RES METFI 0W2 F 0603	B	L8	0R75	-
R2539	CHIPRES 0W06 150K J 0402	B	K8	150K	-
R2540	RES METFI 0W2 F 0603	B	L8	0R75	-
R2581	CHIPRES 0W06 150R J 0603	B	I4	150R	-
R2582	CHIPRES 0W06 150R J 0603	B	I6	150R	-
R2600	CHIPRES 0W125 4R7 J 0805	T	P1	4R7	-
R2700	ASIP SIM INTERFACE **low cap** BGA8	T	G6	-	-
R2800	CHIPRES 0W06 100K J 0402	T	K1	100K	-
R2802	CHIPRES JUMPER 0R0 0402	T	J1	0R0	-
R3000	CHIPRES 0W06 4K7 J 0402	T	I4	4K7	-
R3004	CHIPRES JUMPER 0R0 0603	T	J4	0R0	-
R3005	CHIPRES JUMPER 0R0 0603	T	J1	0R0	-
R3006	CHIPRES JUMPER 0R0 0603	T	K5	0R0	-
R3007	CHIPRES JUMPER 0R0 0603	T	K5	0R0	-
R3200	ASIP MMC FILTER *** PB-FREE ***	T	D7	-	-
R3203	CHIPRES JUMPER 0R0 0402	T	G5	0R0	-
R3204	CHIPRES 0W06 1K2 J 0402	T	D6	1K2	-
R3204	CHIPRES 0W06 1K2 J 0402	T	D6	1K2	-
R3205	CHIPRES 0W06 680R J 0402	T	D6	680R	-
R3205	CHIPRES 0W06 680R J 0402	T	D6	680R	-
R3210	CHIPRES JUMPER 0R0 0603	T	E7	0R0	-
R3211	CHIPRES JUMPER 0R0 0603	T	E7	0R0	-
R3212	CHIPRES JUMPER 0R0 0603	T	D7	0R0	-
R3301	VAR.ARRAY 2X16V 824-915MHZ 0405	B	I8	-	-

Item	Name	PWB Side	XY.	Value	
R3302	CHIPRES JUMPER 0R0 0402	B	I8	0R0	-
R3303	CHIPRES JUMPER 0R0 0402	B	I8	0R0	-
R3541	CHIPRES 0W06 22K J 0402	B	K8	22K	-
R6000	CHIPRES JUMPER 0R0 0402	B	I2	0R0	-
R6010	CHIPRES 0W06 10K J 0402	B	J3	10K	-
R6011	CHIPRES 0W06 8K2 J 0402	B	J3	8K2	-
R6015	CHIPRES JUMPER 0R0 0402	T	B4	0R0	-
R6050	CHIPRES JUMPER 0R0 0603	B	I2	0R0	-
R6051	CHIPRES JUMPER 0R0 0603	B	K2	0R0	-
R6052	CHIPRES JUMPER 0R0 0603	B	I3	0R0	-
R6053	CHIPRES JUMPER 0R0 0603	B	I2	0R0	-
R7500	CHIPRES 0W06 22K J 0402	T	N4	22K	-
R7501	CHIPRES 0W06 4K7 J 0402	T	Q3	4K7	-
R7503	CHIPRES 0W06 1K0 F 200PPM 0402	T	N4	1K0	-
R7504	CHIPRES 0W06 8K2 F 0402	T	N4	8K2	-
R7505	CHIPRES 0W06 5R6 J 0402	T	O3	5R6	-
R7520	CHIPRES 0W06 27K F 0402	T	R5	27K	-
R7521	CHIPRES JUMPER 0R0 0402	T	R3	0R0	-
R7522	CHIPRES JUMPER 0R0 0402	T	R5	0R0	-
R7540	CHIPRES 0W06 47K F 200PPM 0402	T	R7	47K	-
R7541	CHIPRES 0W06 1K0 F 200PPM 0402	T	S6	1K0	-
R7542	CHIPRES JUMPER 0R0 0402	T	Q6	0R0	-
R7543	CHIPRES 0W06 22K J 0402	T	Q6	22K	-
R7544	CHIPRES 0W06 10R J 0402	T	R7	10R	-
R7570	CHIPRES JUMPER 0R0 0402	T	S6	0R0	-
R7571	CHIPRES 0W06 4K7 F 200PPM 0402	T	S6	4K7	-
R8000	CHIPRES JUMPER 0R0 0603	T	Q2	0R0	-
S2583	SM SW TACT SPST 12V SIDE KEY 2.2N	T	C8	-	-
S2587	SM SW TACT SPST 12V SIDE KEY 2.2N	T	Q1	-	-
S2591	SM SW TACT SPST 12V SIDE KEY 2.2N	T	Q9	-	-
S2595	SM SW TACT SPST 12V SIDE KEY 2.2N	T	N9	-	-
T7500	TRANSF BALUN 2134 +/- 30MHZ 0805	T	Q3	-	-
T7501	TRANSF BALUN 3800 +/- 550MHZ 0805	T	O4	-	-
V2000	TVS DI 1PMT16AT3 16V 175W PWRMITE	B	B3	-	-

Item	Name	PWB Side	XY.	Value	
V2002	TR 2SC5658QRS N 50V 0A1 0W15 VMT3	T	C7	-	-
V2500	TR 2SC5658QRS N 50V 0A1 0W15 VMT3	T	F7	-	-
V2581	LED WHITE 100MCD 20MA 0DEG	B	H4	-	-
V2582	LED WHITE 100MCD 20MA 0DEG	B	H6	-	-
X1000	SM CAMERA MOD SKT 2X8F	T	O6	-	-
X2000	SM SYSTEM CONNECTOR 14POL	T	A5	-	-
X2061	MODULE ID COMPONENT 2.8X1.8X0.3	B	L2	-	-
X2070	SM BATTERY CONN 3POL SPR 12V 2A	T	M6	-	-
X2530	C-SPRING ANTENNA	T	M8	-	-
X2531	C-SPRING ANTENNA	T	M8	-	-
X2700	SM SIM CONN 6POL P2.54 H1.8	T	F8	-	-
X3200	CONN MINISD PUSH - PUSH 10V 0.5A	T	E3	-	-
X8000	SM CONN RF JACK 50R 2W 6GHZ	T	Q2	-	-
X8001	C-SPRING ANTENNA (active)	T	S2	-	-
X8002	C-SPRING ANTENNA	T	S2	-	-
X8003	SM CONN RF JACK 50R 2W 6GHZ	T	O8	-	-
X8004	C-SPRING ANTENNA (active)	T	R8	-	-
X8005	C-SPRING ANTENNA	T	R8	-	-
X8006	C-SPRING ANTENNA	T	S1	-	-
Z2000	FERRITE BEAD 0.6R 600R/100MZ 0402	B	A4	600R/ 100Mhz	-
Z2001	FERRITE BEAD 0.6R 600R/100MZ 0402	B	B4	600R/ 100Mhz	-
Z2005	FERRITE BEAD 0.6R 600R/100MZ 0402	B	B4	600R/ 100Mhz	-
Z2403	ASIP 10-CH ESD EMI FILTER BGA25	B	I4	-	-
Z2404	ASIP 10-CH ESD EMI FILTER BGA25	B	I5	-	-
Z2580	ASIP 10-CH ESD EMI FILTER BGA25	B	I7	-	-
Z3300	ASIP 10-CH ESD EMI FILTER BGA25	B	I6	-	-
Z7500	TX SAW MODULE GSM 850/900MHz	T	Q5	-	-
Z7540	DUPL BAW 1920-1980/2110-2170MHZ 3.8x3.8	T	Q7	-	-

Component layouts

Note: See also lager size layouts in the Schematics section (page 10–9).

Component layout, bottom

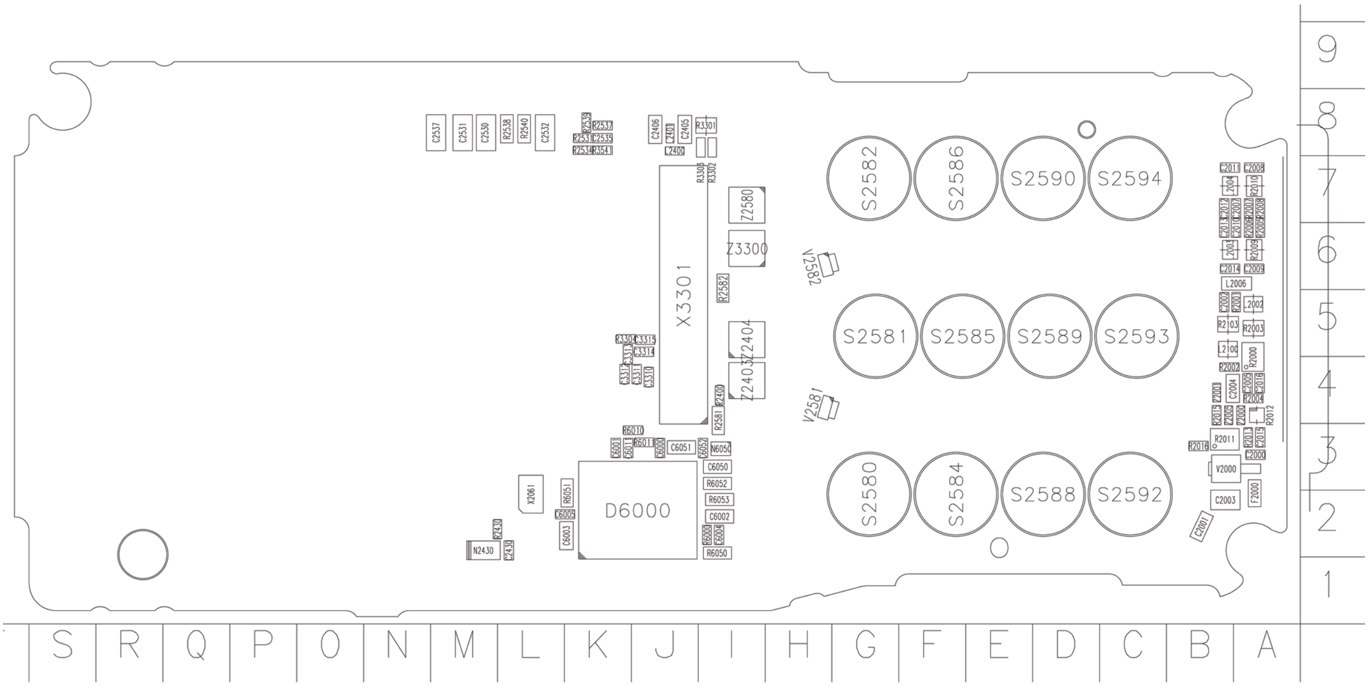

S2582
S2586
S2590
S2594
S2581
S2585
S2589
S2593
S2580
S2584
S2588
S2592
X3301
Z2580
Z3300
Z2404
Z2403
V2582
V2581
D6000
9
8
7
6
5
4
3
2
1
S
R
Q
P
O
N
M
L
K
J
I
H
G
F
E
D
C
B
A

Figure 4 Component layout, RM-78, 1mda_05a, bottom

Component layout, top

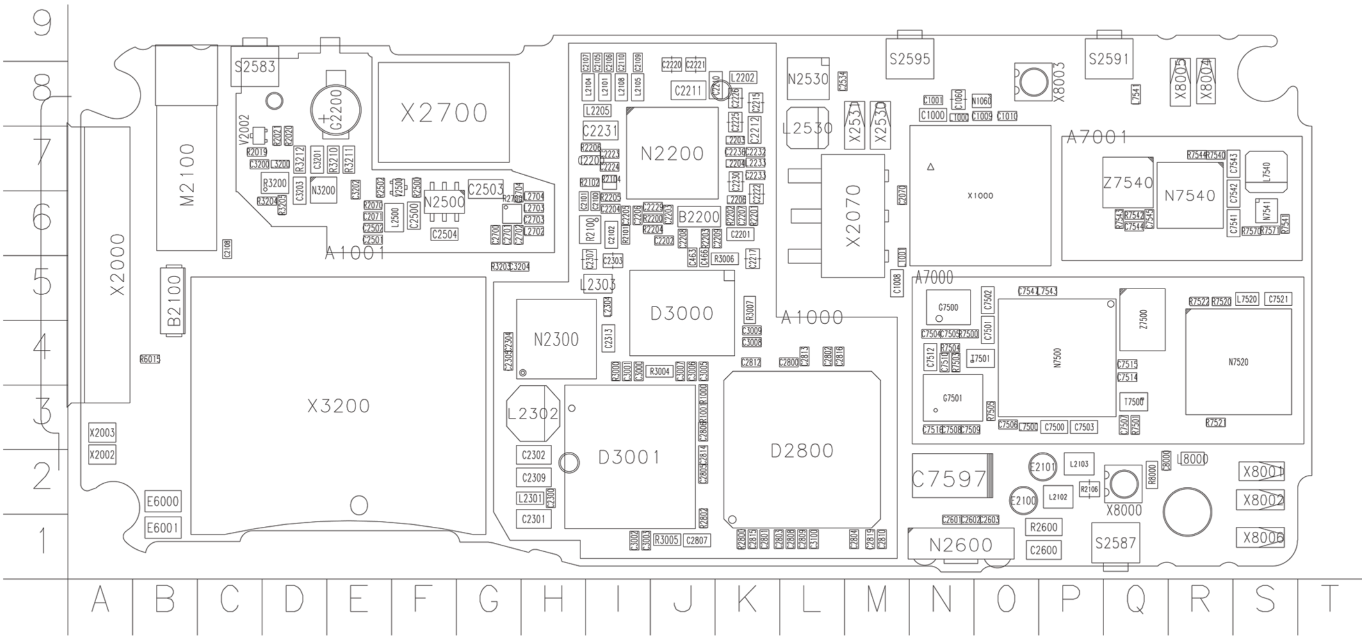

S2583
G2200
X2700
M2100
X2000
B2100
X3200
N2500
C2503
A1001
N2200
B2200
C2231
L2303
N2300
D3000
D3001
L2302
D2800
N2530
L2530
X2070
S2595
S2591
X8003
X8005
X8004
A7001
Z7540
N7540
X1000
A7000
A1000
N7500
N7520
C7597
N2600
X8000
S2587
X8001
X8002
X8006
E6000
E6001
X2003
X2002
9
8
7
6
5
4
3
2
1
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T

Figure 5 Component layout, RM-78, 1mda_05a top

(This page left intentionally blank.)

3 — Service Software Instructions

(This page left intentionally blank.)

Table of Contents

Phoenix installation steps in brief....3–5
Installing Phoenix....3–6
Updating Phoenix installation....3–8
Uninstalling Phoenix....3–9
Repairing Phoenix installation....3–11
Phone data package overview....3–12
Installing phone data package....3–12
Uninstalling phone data package....3–16
Configuring users in Phoenix....3–18
Managing connections in Phoenix....3–18
Installing flash support files for FPS-8 and FPS-10....3–20
Updating FPS-8 and FPS-10 flash prommer software....3–23
Activating FPS-8....3–25
Deactivating FPS-8....3–26

List of Figures

Figure 6 Dongle not found....3–6
Figure 7 Disclaimer text....3–7
Figure 8 InstallShield Wizard Complete....3–8
Figure 9 Installation interrupted....3–9
Figure 10 Remove program....3–10
Figure 11 Finish uninstallation....3–11
Figure 12 Repair program....3–12
Figure 13 Data package setup information....3–14
Figure 14 Data package destination folder....3–15
Figure 15 InstallShield Wizard Complete....3–16
Figure 16 Uninstalling phone data package....3–17
Figure 17 Finishing data package uninstallation....3–17
Figure 18 Phoenix login....3–18
Figure 19 New user configured....3–18
Figure 20 Select mode: Manual....3–19
Figure 21 Connections list....3–20
Figure 22 Connection information....3–20
Figure 23 Product support module information (example from RM-1)....3–20
Figure 24 Flash update welcome dialog....3–21
Figure 25 Flash installation interrupted....3–21
Figure 26 Flash destination folder....3–22
Figure 27 Finish flash update....3–23
Figure 28 Flash directory window....3–24
Figure 29 Prommer software update finished....3–24
Figure 30 Prommer Maintenance window....3–25
Figure 31 Box activation....3–26
Figure 32 Deactivation warning....3–26

(This page left intentionally blank.)

Phoenix installation steps in brief

Before you begin

Recommended hardware requirements:

- Computer processor: Pentium 700 MHz or higher
- RAM 256 MB
- Disk space 100-300 MB

Supported operating systems:

- *Windows 2000* Service Pack 3 or higher
- *Windows XP* Service Pack 1 or higher

Context

Phoenix is a service software for reprogramming, testing and tuning phones.

Phoenix installation contains:

- Service software support for all phone models included in the package
- Flash update package files for programming devices
- All needed drivers for:
  - DK2 dongle
  - DKU-2 USB cable

Note: Separate installation packages for flash update files and drivers are also available, but it is not necessary to use them unless there are updates between *Phoenix* service software releases. If separate update packages are used, they should be used after *Phoenix* and data packages have been installed.

The phone model specific data package includes all changing product specific data:

- Product software binary files
- Files for type label printing
- Validation file for the faultlog repair data reporting system
- All product specific configuration files for *Phoenix* software components

Note: *Phoenix* and phone data packages should only be used as complete installation packages. Uninstallation should be made from the *Windows* Control Panel.

To use *Phoenix*, you need to:

Steps

1. Connect a DK2 dongle to the computer parallel port.
2. Install *Phoenix*.
3. Install the phone-specific data package.
4. Configure users.
5. Manage connection settings (depends on the tools you are using).

If you use FPS-8:	• Update FPS-8 software • Activate FPS-8

If you use FPS-10:	• Update FPS-10 software **Note:** There is no need to activate FPS-10. • Activate SX-4 smart card, if you need tuning and testing functions. **Note:** When FPS-10 is used only for product software updates, SX-4 smart card is not needed.

Results

Phoenix is ready to be used with FPS-8 or FPS-10 flash prommers and other service tools.

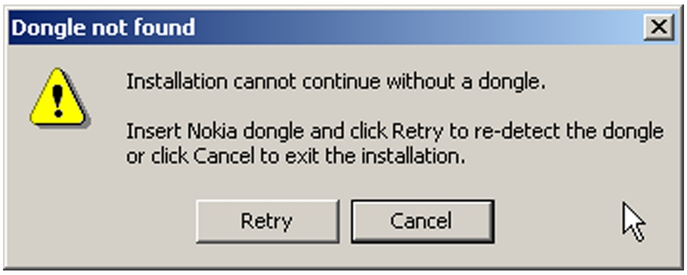
Installing *Phoenix*

Before you begin

- Check that a dongle is attached to the parallel port of your computer.
- Download the *Phoenix* installation package (for example, *phoenix_service_sw_2004_39_x_xx.exe*) to your computer (in *C:|TEMP*, for instance).
- Close all other programs.
- Depending on your operating system, administrator rights may be required to install *Phoenix*.
- If uninstalling or rebooting is needed at any point, you will be prompted by the InstallShield program.

Context

At some point during the installation procedure, you may get the following message:



Dongle not found

Installation cannot continue without a dongle.

Insert Nokia dongle and click Retry to re-detect the dongle or click Cancel to exit the installation.

Figure 6 Dongle not found

This may be a result of a defective or too old PKD-1 dongle.

Check the COM/parallel ports used. After correcting the problem, you can restart the installation.

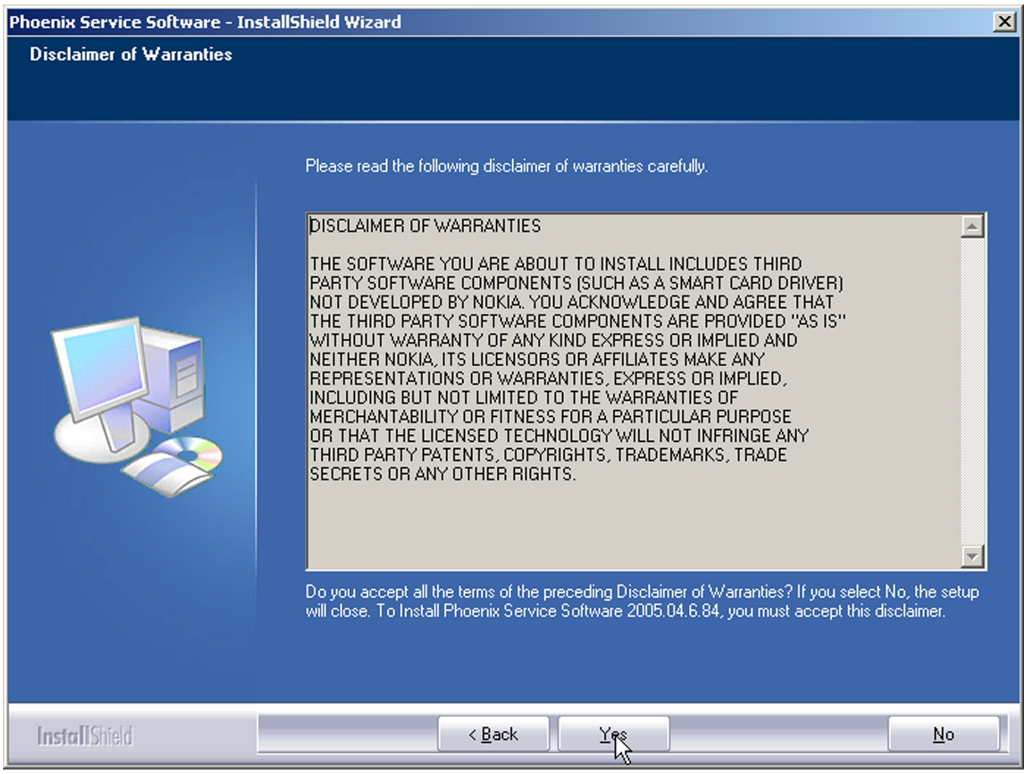
For more detailed information, please refer to *Phoenix* Help files.

> **Tip:** Each feature in *Phoenix* has its own Help function, which can be activated while running the program. Press the **F1** key or the feature's **Help** button to activate a Help file.

Steps

1. To start the installation, run the application file (for example,*phoenix_service_sw_2004_39_x_xx.exe*).
2. In the *Welcome* dialogue, click **Next**.

3. Read the disclaimer text carefully and click **Yes**.



Please read the following disclaimer of warranties carefully.

DISCLAIMER OF WARRANTIES

THE SOFTWARE YOU ARE ABOUT TO INSTALL INCLUDES THIRD PARTY SOFTWARE COMPONENTS (SUCH AS A SMART CARD DRIVER) NOT DEVELOPED BY NOKIA. YOU ACKNOWLEDGE AND AGREE THAT THE THIRD PARTY SOFTWARE COMPONENTS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND EXPRESS OR IMPLIED AND NEITHER NOKIA, ITS LICENSORS OR AFFILIATES MAKE ANY REPRESENTATIONS OR WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR THAT THE LICENSED TECHNOLOGY WILL NOT INFRINGE ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADEMARKS, TRADE SECRETS OR ANY OTHER RIGHTS.

Do you accept all the terms of the preceding Disclaimer of Warranties? If you select No, the setup will close. To Install Phoenix Service Software 2005.04.6.84, you must accept this disclaimer.

Figure 7 Disclaimer text

4. Choose the destination folder.

   The default folder *C:|ProgramFiles|Nokia|Phoenix* is recommended.

5. To continue, click **Next.**

   To choose another location, click **Browse** (not recommended).

6. Wait for the components to be copied.

   The progress of the installation is shown in the *Setup Status* window.

7. Wait for the drivers to be installed and updated.

   The process may take several minutes to complete.

   If the operating system does not require rebooting, the PC components are registered right away.

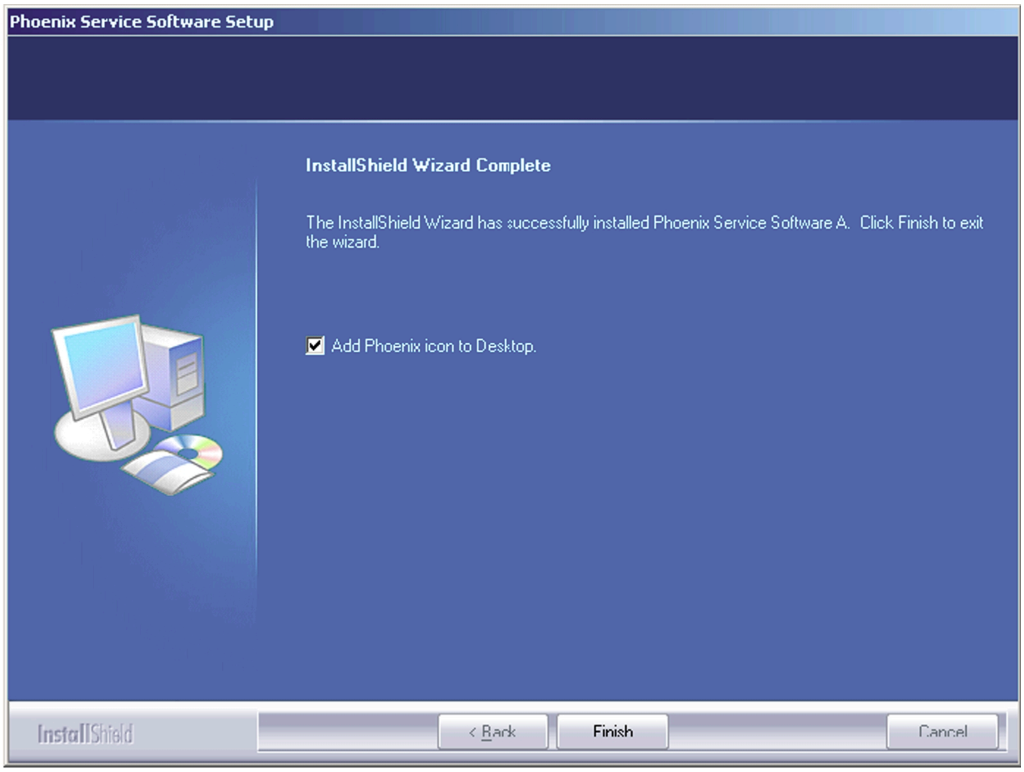
   If the operating system requires restarting your computer, the Install Shield Wizard will notifies about it.

   Select **Yes...** to reboot the PC immediately or **No...** to reboot the PC manually afterwards.

   After the reboot, all components are registered.

   Note: *Phoenix* does not work, if the components have not been registered.

8. To end the installation, click **Finish**.



Phoenix Service Software Setup

InstallShield Wizard Complete

The InstallShield Wizard has successfully installed Phoenix Service Software A. Click Finish to exit the wizard.

☑ Add Phoenix icon to Desktop.

Figure 8 InstallShield Wizard Complete

Next action

After the installation, *Phoenix* can be used after:

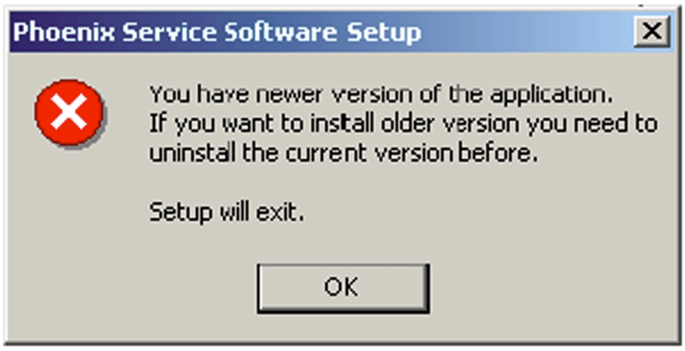
- installing phone model specific data package for *Phoenix*
- configuring users and connections

FPS-8 and FPS-10 flash prommers can be used after updating their flash update package files.

Updating *Phoenix* installation

Context

- If you already have the *Phoenix* service software installed on your computer, you need to update the software when new versions are released.
- To update *Phoenix*, you need to follow the same steps as when installing it for the first time.
- When you are updating, for example, from version **a14_2004_16_4_47** to **a15_2004_24_7_55**, the update will take place automatically without uninstallation.
- Always use the latest available versions of both *Phoenix* and the phone-specific data package. Instructions can be found in the phone model specific Technical Bulletins and phone data package *readme.txt* files (shown during installation).
- If you try to update *Phoenix* with the same version you already have (for example, **a15_2004_24_7_55** to **a15_2004_24_7_55**), you are asked if you want to uninstall the existing version. In this case you can choose between a total uninstallation or a repair installation in a similar way when choosing to uninstall the application from the *Windows* Control Panel.
- If you try to install an older version (for example, downgrade from **a15_2004_24_7_55** to **a14_2004_16_4_47**), installation will be interrupted.



Phoenix Service Software Setup

You have newer version of the application.
If you want to install older version you need to uninstall the current version before.

Setup will exit.

Figure 9 Installation interrupted

- Always follow the instructions on the screen.

Steps

1. Download the installation package to your computer hard disk.
2. Close all other programs.
3. Run the application file (for example, *phoenix_service_sw_2004_39_x_xx.exe*).

Results

A new *Phoenix* version is installed and driver versions are checked and updated.

Uninstalling *Phoenix*

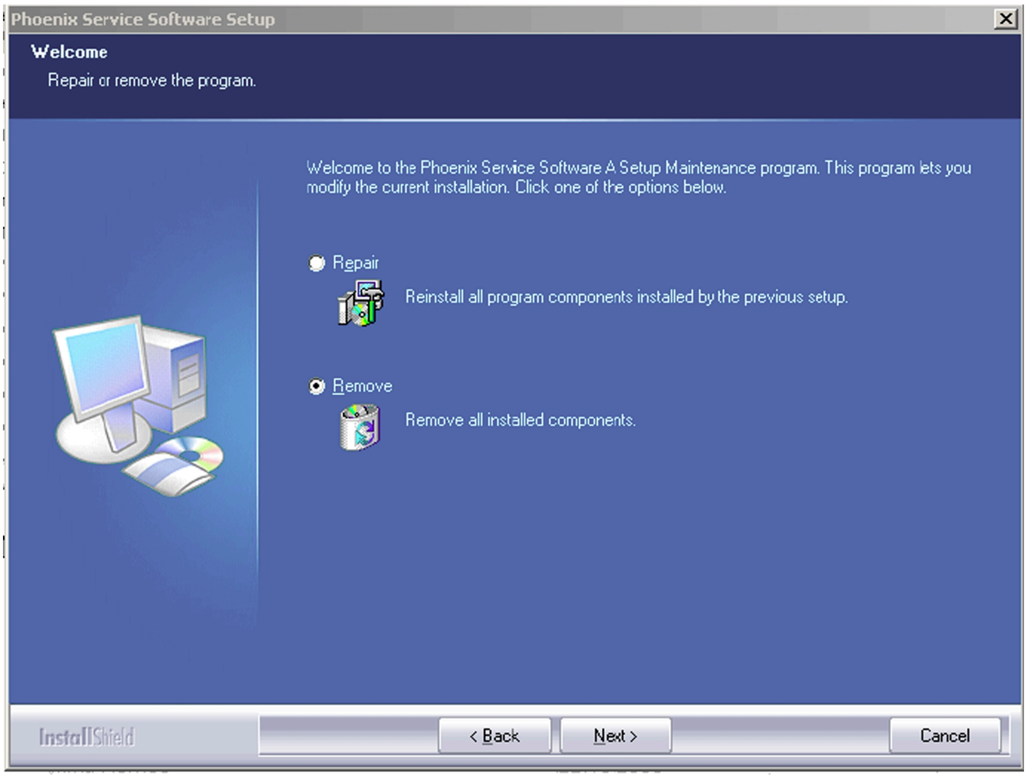
Context

You can uninstall *Phoenix* service software manually from the *Windows* Control Panel.

Steps

1. Open the **Windows Control Panel**, and choose **Add/Remove Programs**.

2. To uninstall *Phoenix*, choose **Phoenix Service Software→Change/Remove→Remove** .


Phoenix Service Software Setup
Welcome
Repair or remove the program.
InstallShield
< Back
Next >
Cancel

Welcome to the Phoenix Service Software A Setup Maintenance program. This program lets you modify the current installation. Click one of the options below.

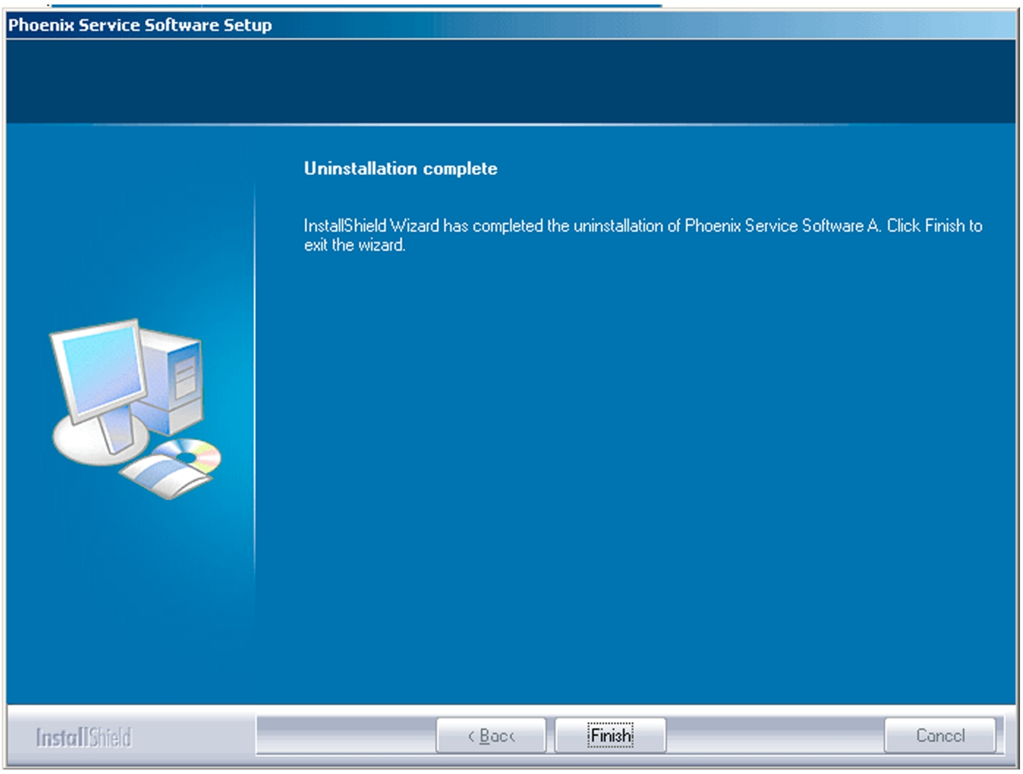
○ Repair
Reinstall all program components installed by the previous setup.

● Remove
Remove all installed components.

Figure 10 Remove program

The progress of the uninstallation is shown.

3. If the operating system does not require rebooting, click **Finish** to complete.



Uninstallation complete

InstallShield Wizard has completed the uninstallation of Phoenix Service Software A. Click Finish to exit the wizard.

Figure 11 Finish uninstallation

If the operating system requires rebooting, InstallShield Wizard will notify you. Select **Yes...** to reboot the PC immediately and **No...** to reboot the PC manually afterwards.

Repairing *Phoenix* installation

Context

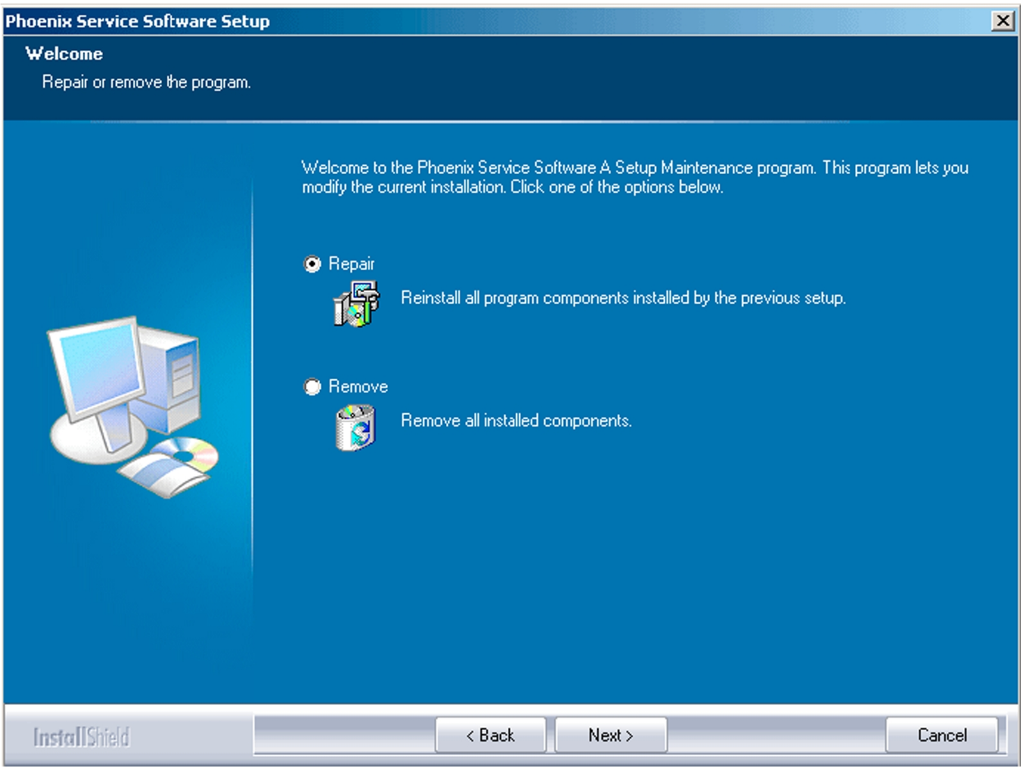
If you experience any problems with the service software or suspect that files have been lost, use the repair function before completely reinstalling *Phoenix*.

> **Note:** The original installation package (for example, *phoenix_service_sw_a15_2004_24_7_55.exe*) must be found on your PC when you run the repair setup.

Steps

1. Open **Windows Control Panel→Add/Remove Programs** .
2. Choose **Phoenix Service Software→Change/Remove** .

3. In the following view, select **Repair**.



Phoenix Service Software Setup

Welcome

Repair or remove the program.

Welcome to the Phoenix Service Software A Setup Maintenance program. This program lets you modify the current installation. Click one of the options below.

● Repair

Reinstall all program components installed by the previous setup.

○ Remove

Remove all installed components.

Figure 12 Repair program

Phoenix reinstalls components and registers them.

The procedure is the same as when updating *Phoenix*.

4. To complete the repair, click **Finish**.

Phone data package overview

Each product has its own data package (DP). The product data package contains all product-specific data files to make the Phoenix service software and tools usable with a certain phone model.

The phone data package contains the following:

- Product software binary files
- Files for type label printing
- Validation file for the fault log repair data reporting system
- All product-specific configuration files for Phoenix software components

Data files are stored in **C:\Program Files\Nokia\Phoenix** (default).

Installing phone data package

Before you begin

- A phone-specific data package contains all data required for the *Phoenix* service software and service tools to be used with a certain phone model.
- Check that a dongle is attached to the parallel port of your computer.
- Install *Phoenix* service software.

- Download the installation package (for example, *XX-XX_dp_EA_v_1_0.exe*) to your computer (for example, in C:\TEMP).
- Close all other programs.

(XX-XX = type designator of the product)

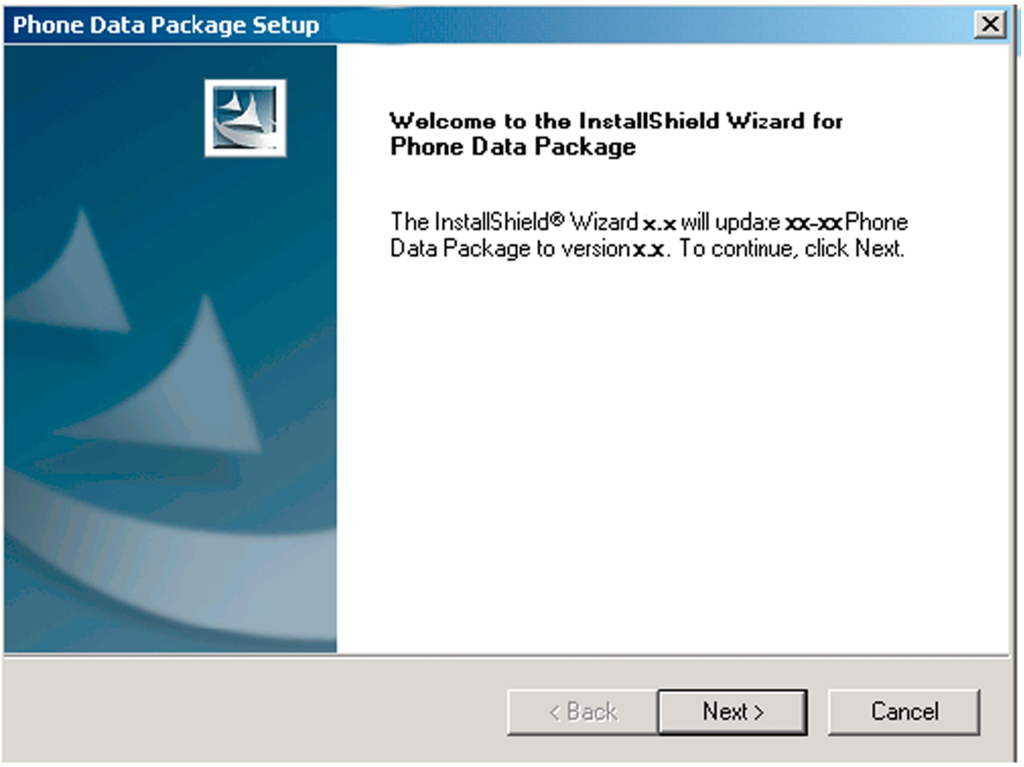
If you already have *Phoenix* installed on your computer, you will need to update it when a new version is released.

> **Note:** Often *Phoenix* and the phone-specific data package come in pairs, meaning that a certain version of *Phoenix* can only be used with a certain version of a data package. Always use the latest available versions of both. Instructions can be found in phone-specific Technical Bulletins and *readme.txt* files of data packages.

Steps

1. To start the installation, run the application file (for example, *XX-XX_dp_EA_ v_1_0.exe*),

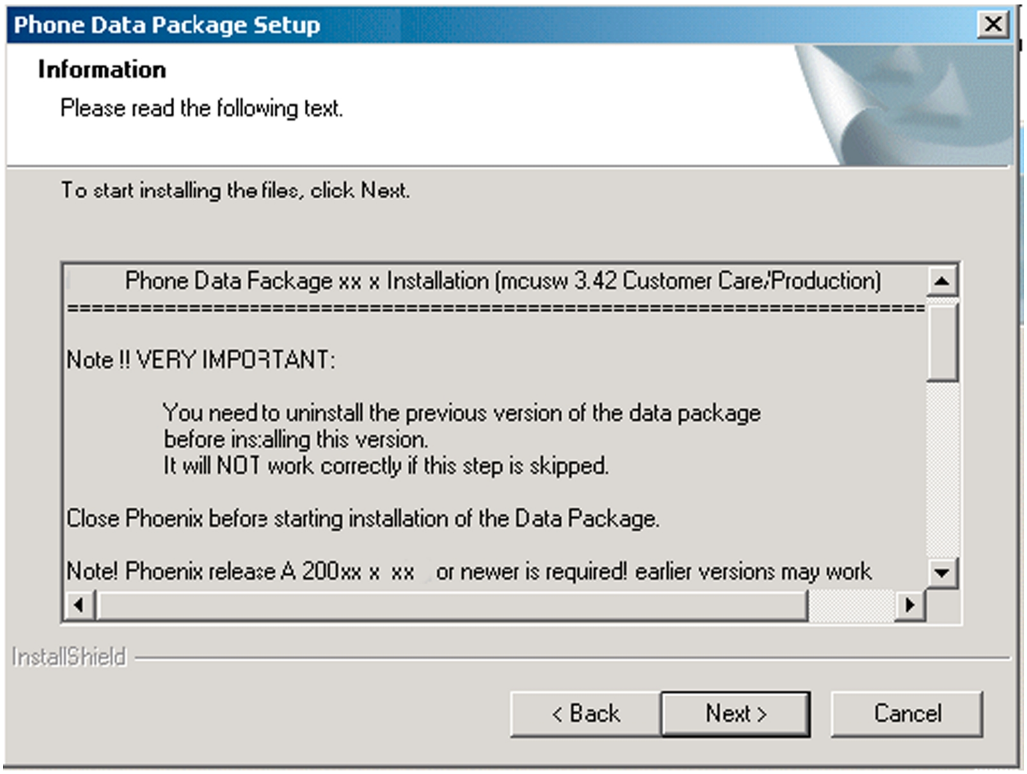
   Wait for the installation files to be extracted.
2. Click **Next**.



Welcome to the InstallShield Wizard for Phone Data Package

The InstallShield® Wizard x.x will update xx-xx Phone Data Package to version x.x. To continue, click Next.

3. In the following view you can see the contents of the data package. Read the text carefully. There is information about the *Phoenix* version required with this data package.



Please read the following text.

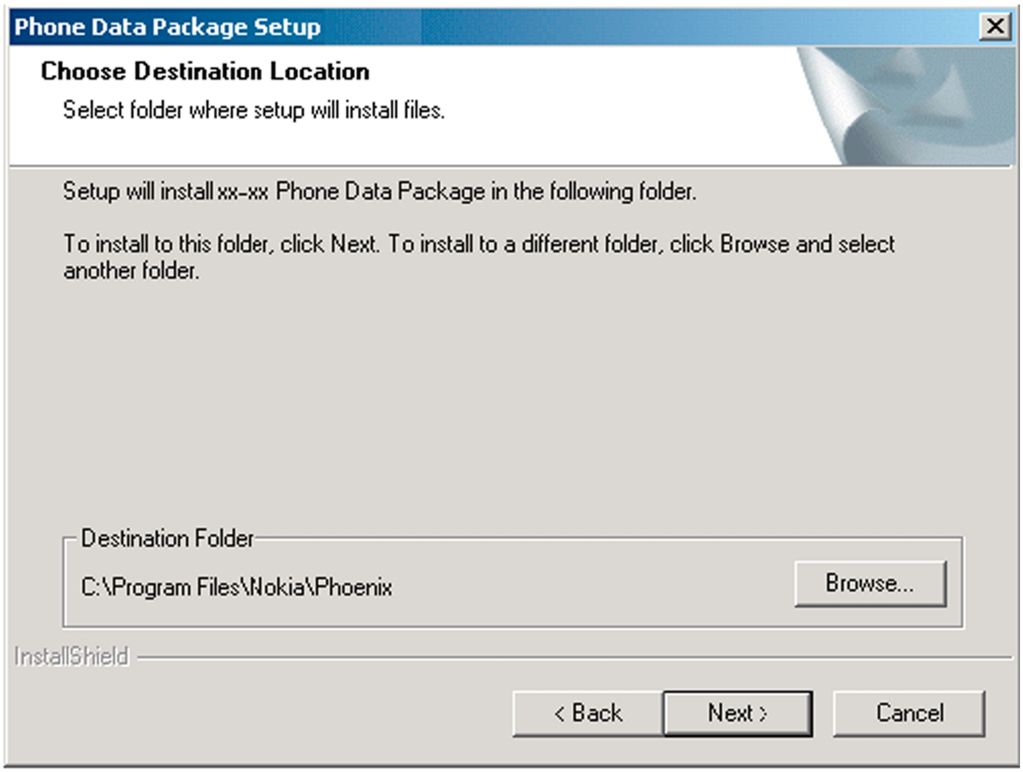
To start installing the files, click Next.

```
     Phone Data Package xx x Installation (mcusw 3.42 Customer Care/Production)
==========================================================================

Note !! VERY IMPORTANT:

        You need to uninstall the previous version of the data package
        before installing this version.
        It will NOT work correctly if this step is skipped.

Close Phoenix before starting installation of the Data Package.

Note! Phoenix release A 200xx x  xx   or newer is required! earlier versions may work
```

Figure 13 Data package setup information

4. To continue, click **Next**.

5. Choose the destination folder, and click **Next** to continue.



Phone Data Package Setup

Choose Destination Location

Select folder where setup will install files.

Setup will install xx-xx Phone Data Package in the following folder.

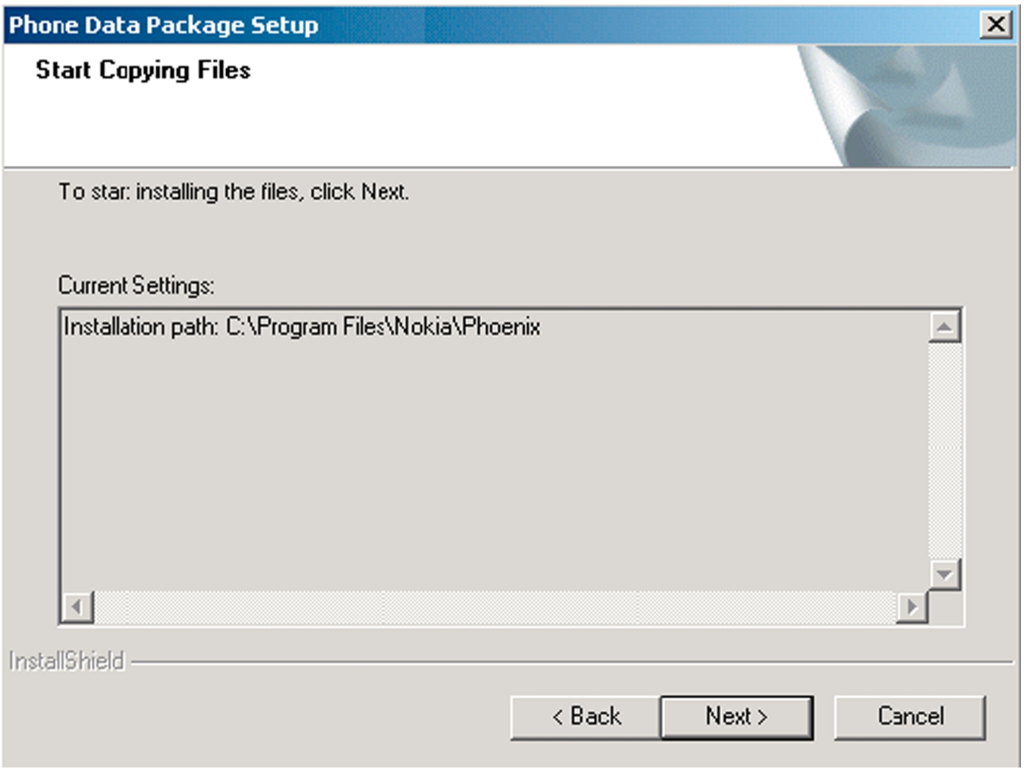
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.

Destination Folder: C:\Program Files\Nokia\Phoenix

Figure 14 Data package destination folder

The InstallShield Wizard checks where *Phoenix* is installed, and the directory is shown.

6. To start copying the files, click **Next**.



Phone Data Package Setup

Start Copying Files

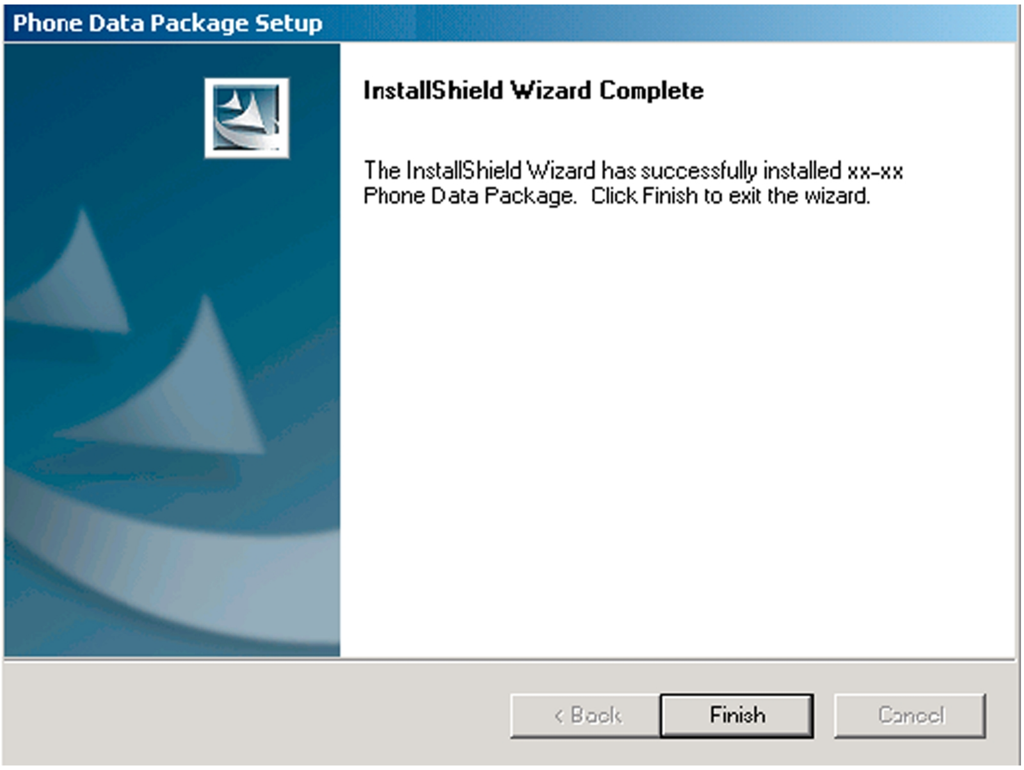
To star: installing the files, click Next.

Current Settings:

Installation path: C:\Program Files\Nokia\Phoenix

Phone model specific files are installed. Please wait.

7. To complete the installation, click **Finish**.



InstallShield Wizard Complete

The InstallShield Wizard has successfully installed xx-xx Phone Data Package. Click Finish to exit the wizard.

Figure 15 InstallShield Wizard Complete

Next action

Phoenix can be used for flashing phones and printing type labels after:

- Configuring users
- Managing connections

FPS-8 and FPS-10 can be used after updating their flash update package files.

Uninstalling phone data package

Context

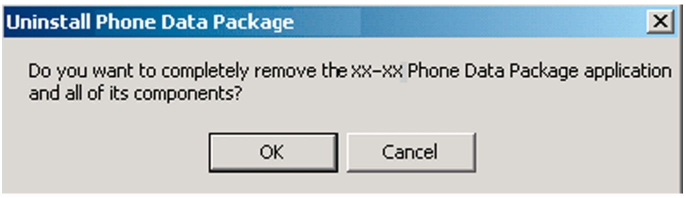
There is no need to uninstall an older version of a data package, unless instructions to do so are given in the *readme.txt* file of the data package and bulletins related to the release.

Please read all related documents carefully.

Steps

1. Locate the data package installation file (e.g. *XX-XX_dp_EA_v_1_0.exe*) from your computer.
2. To start the uninstallation procedure, double-click the data package installation file.

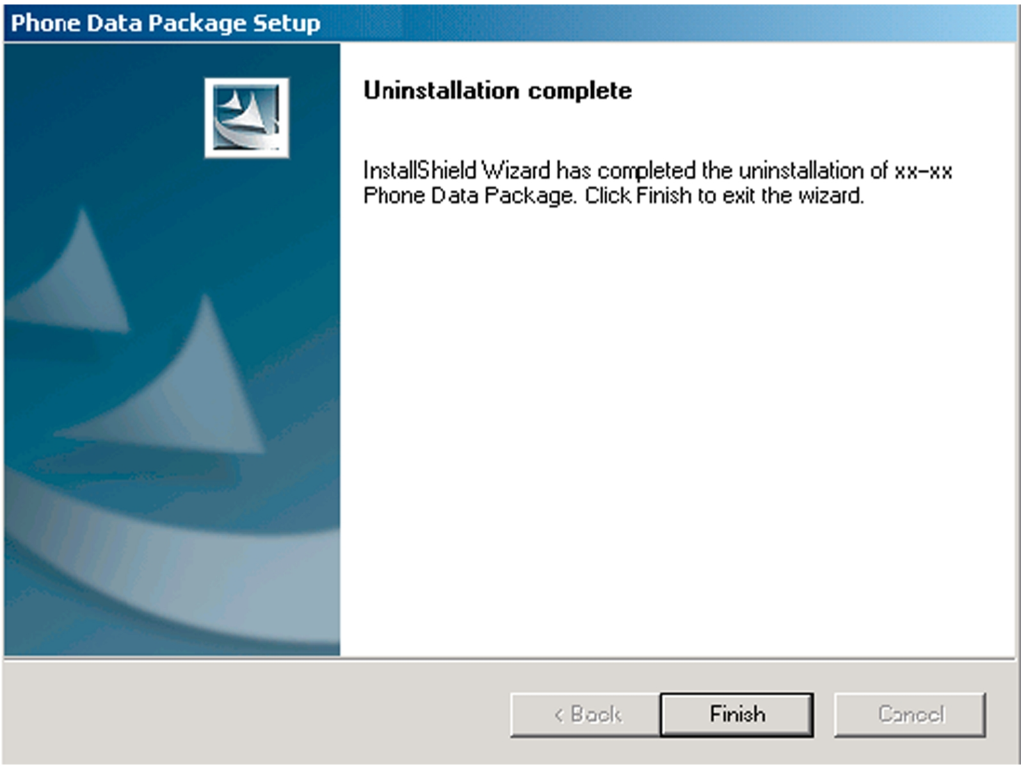
3. To uninstall the data package, click **OK** or to interrupt the uninstallation, click **Cancel**.


Uninstall Phone Data Package
OK
Cancel

Do you want to completely remove the xx-xx Phone Data Package application and all of its components?

Figure 16 Uninstalling phone data package

4. When the data package is uninstalled, click **Finish**.


Phone Data Package Setup
< Back
Finish
Cancel

Uninstallation complete

InstallShield Wizard has completed the uninstallation of xx-xx Phone Data Package. Click Finish to exit the wizard.

Figure 17 Finishing data package uninstallation

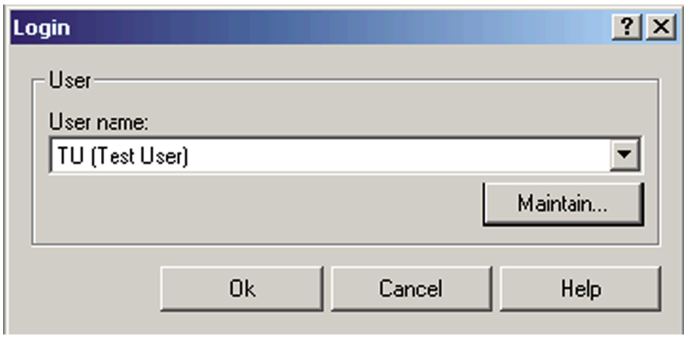
Alternative steps

- You can also uninstall the data package manually from **Control Panel→Add/Remove Programs→xx-xx* Phone Data Package** . (*= type designator of the phone).

Configuring users in *Phoenix*

Steps

1. Start *Phoenix* service software, and log in.



User name: TU (Test User)

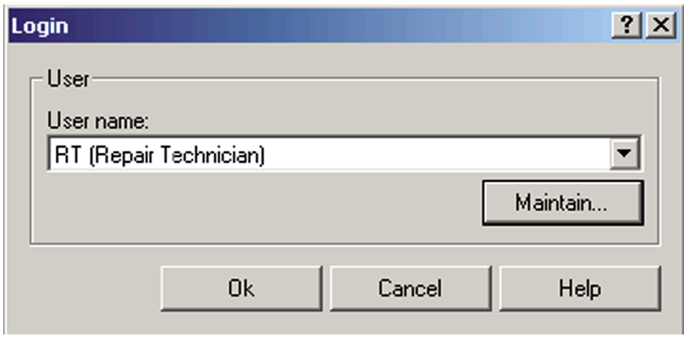
Figure 18 Phoenix login

   If the user ID is already configured, select s/he from the *User name* drop-down list, and click **OK**.

2. To add a new user, or to edit existing ones, click **Maintain**.
3. To add a new user, click **New**.
4. Type in the name and initials of the user, and click **OK**.

   The user is added to the user name list.

5. Select the desired user from the *User name* drop-down list, and click **OK**.



User name: RT (Repair Technician)

Figure 19 New user configured

Managing connections in *Phoenix*

Context

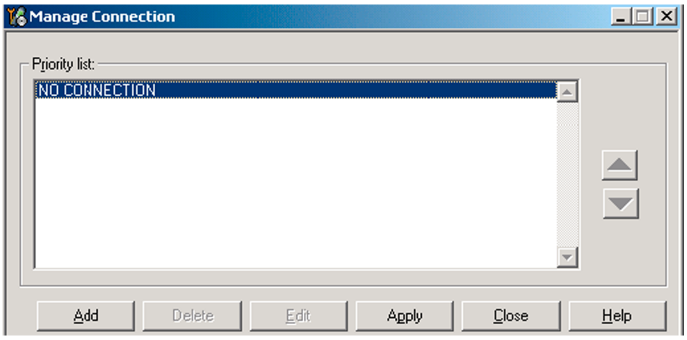
With the **Manage Connections** feature you can edit and delete existing connections or create new ones.

> **Note:** After choosing the desired connection, and connecting the phone to a PC for the first time, allow the PC to install the USB device drivers first. Please note that this may take some time to complete.
>
> If there are problems after the driver installation, check that the USB connection is active from the **Windows Control Panel**. If the problem persists, contact the local PC support.

Steps

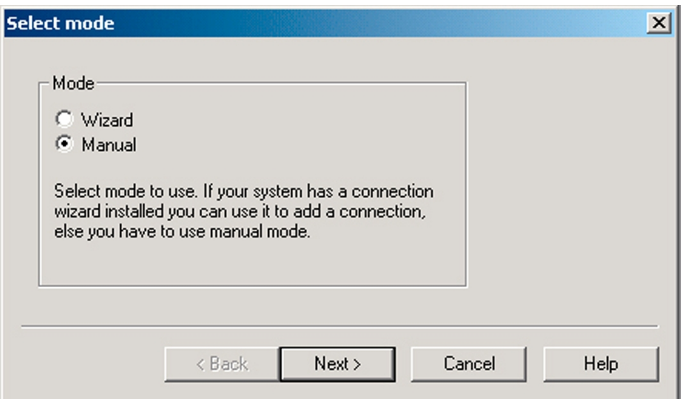
1. Start *Phoenix*, and log in.
2. Choose **File→Manage Connections...** .

3. To add a new connection, click **Add**.



4. Select **Manual** mode, and click **Next** to continue.

   If you want to create the connection using the Connection Wizard, connect the tools and a phone to your PC. The wizard will automatically try to configure the correct connection.



Select mode to use. If your system has a connection wizard installed you can use it to add a connection, else you have to use manual mode.

Figure 20 Select mode: Manual

i For an FPS-10 flash prommer with a **USB Connection**, choose the following connection settings:

- Media: **FPS-10 USB**
- DEVICE_INDEX: **0**
- SERIAL_NUM: See Serial No from the label attached to the bottom of FPS-10
- ACTIVE_MEDIA: **USB**

ii For an FPS-10 flash prommer with a **LAN connection**, choose the following connection settings:

- Media: **FPS-10 TCP/IP**
- NET_SERV_NAME: Click **Scan...**. Choose your own FPS-10 device based on the correct MAC address. See Serial No from the label attached to the bottom of your FPS-10.
- PORT_NUM: Use the default value, and click **Next**.
- PROTOCOL_FAMILY: Use the default value, and click **Next**.
- SOCKET TYPE: Use the default value, and click **Next**.
- TX_BUFFER_SIZE: Use the default value, and click **Next**.
- RX_BUFFER_SIZE: Use the default value, and click **Next**.

iii For an FPS-8 flash prommer, choose the following connection settings:

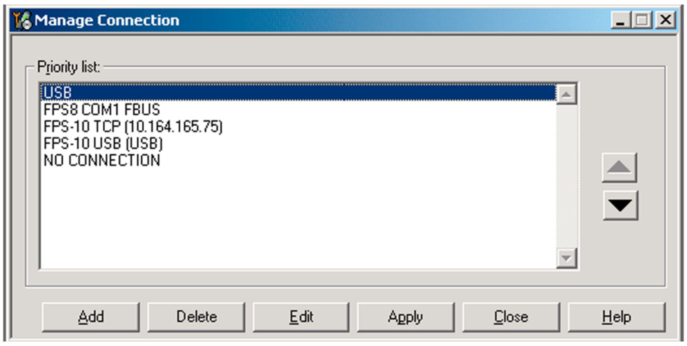
- Media: FPS-8
- PORT_NUM: COM Port where FPS-8 is connected
- COMBOX_DEF_MEDIA: **FBUS**

iv For a plain **USB connection**, choose the following connection settings:

Note: First connect the DKU-2 USB cable between the PC USB port and phone.

- Media: USB

5. To complete the configuration, click **Finish**.
6. Click the connection you want to activate. Use the up/down arrows located on the right hand side to move it on top of the list, then click **Apply**.



USB
FPS8 COM1 FBUS
FPS-10 TCP (10.164.165.75)
FPS-10 USB (USB)
NO CONNECTION

Figure 21 Connections list

The connection is activated, and it can be used after closing the *Manage Connection* window.

The connection information is shown at the right hand bottom corner of the screen.

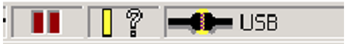
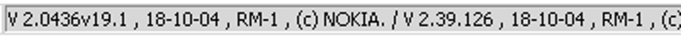


Figure 22 Connection information

7. To use the connection, connect the phone to your PC with correct service tools. Make sure the phone is switched on, and then choose **File→Scan Product** .

Results

The product support module information appears in the status bar:



V 2.0436v19.1 , 18-10-04 , RM-1 , (c) NOKIA. / V 2.39.126 , 18-10-04 , RM-1 , (c)

Figure 23 Product support module information (example from RM-1)

Installing flash support files for FPS-8 and FPS-10

Before you begin

- Install *Phoenix* service software.
- Install phone model specific data package for *Phoenix*.
- If you want to update the flash support files, they are delivered in the same installation package with *Phoenix* or newer *Phoenix* packages beginning from December 2004.

  In case you want to update the MCU files, install the latest data package (see Technical Bulletins for information on the latest one).

  Normally, it is enough to install *Phoenix* and the phone-specific data package because the installation always includes the latest flash update package files for FPS-8 and FPS-10.
- A separate installation package for flash support files is available. The files can be updated according to these instructions, if updates appear between *Phoenix* data package releases.

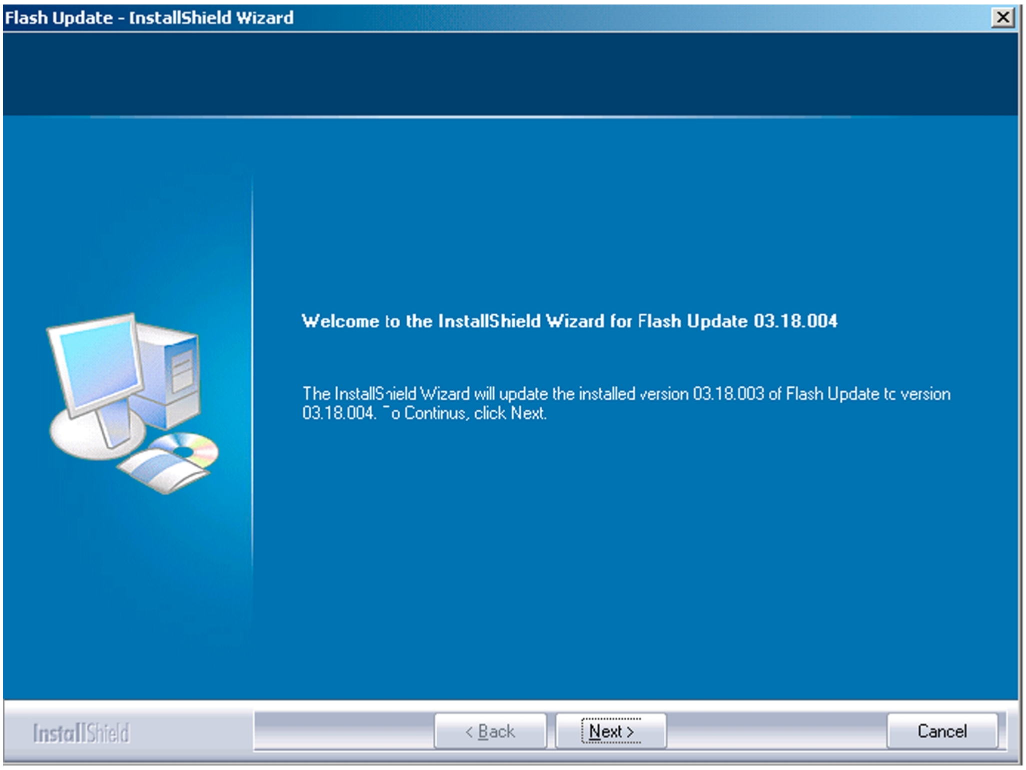
COMPANY CONFIDENTIAL

Context

If you are not using a separate installation package, you can skip this section and continue with "Updating FPS-8 and FPS-10 flash prommer software,, (page 3–23) after installing a new phone data package.

Steps

1. To begin the installation, double-click the flash update file (for example, *flash_update_03_183_0014.exe*).



Welcome to the InstallShield Wizard for Flash Update 03.18.004

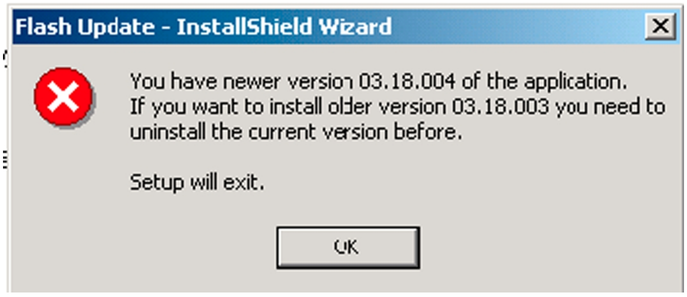
The InstallShield Wizard will update the installed version 03.18.003 of Flash Update to version 03.18.004. To Continue, click Next.

Figure 24 Flash update welcome dialog

If the same version of the flash update package already exists, and you want to reinstall it, the previous package is first uninstalled.

Restart installation again after the uninstallation.

2. If you try to downgrade the existing version to older ones, the setup will be aborted. If there is a need to downgrade the version, uninstall newer files manually from the **Windows Control Panel**, and then rerun the installation.



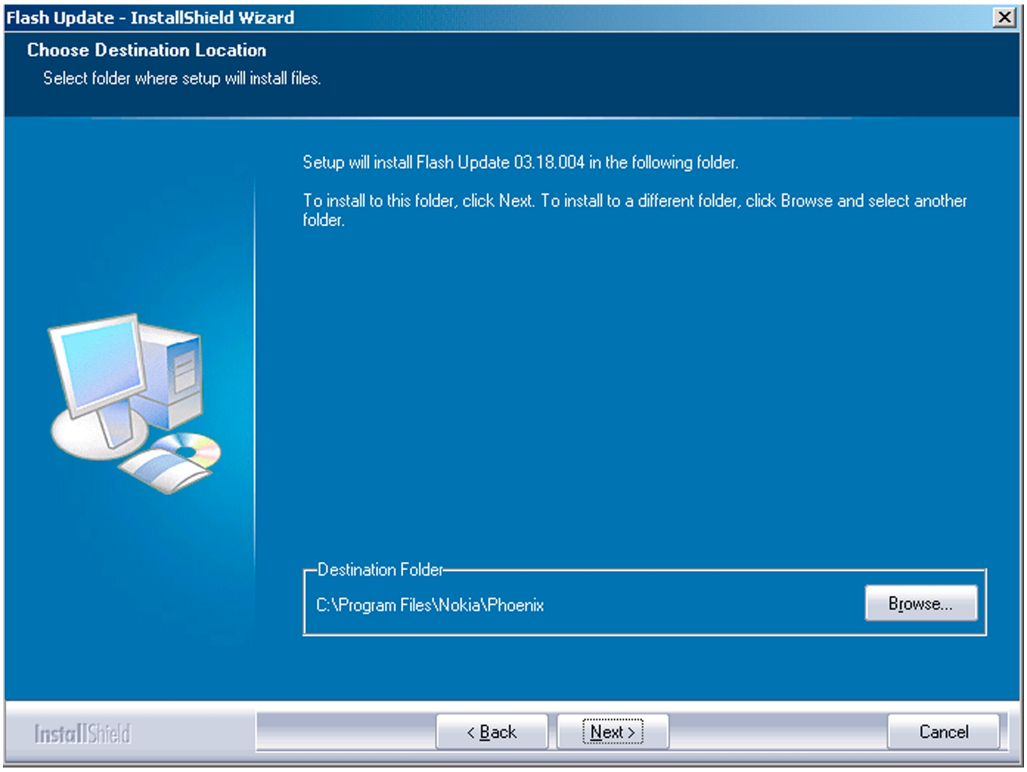
You have newer version 03.18.004 of the application.
If you want to install older version 03.18.003 you need to uninstall the current version before.

Setup will exit.

Figure 25 Flash installation interrupted

If an older version exists on your PC and it needs to be updated, click **Next** to continue installation.

3. It is recommended to install the files to the default destination folder *C:|Program Files|Nokia|Phoenix*. To continue, click **Next**.



Flash Update - InstallShield Wizard

Choose Destination Location

Select folder where setup will install files.

Setup will install Flash Update 03.18.004 in the following folder.

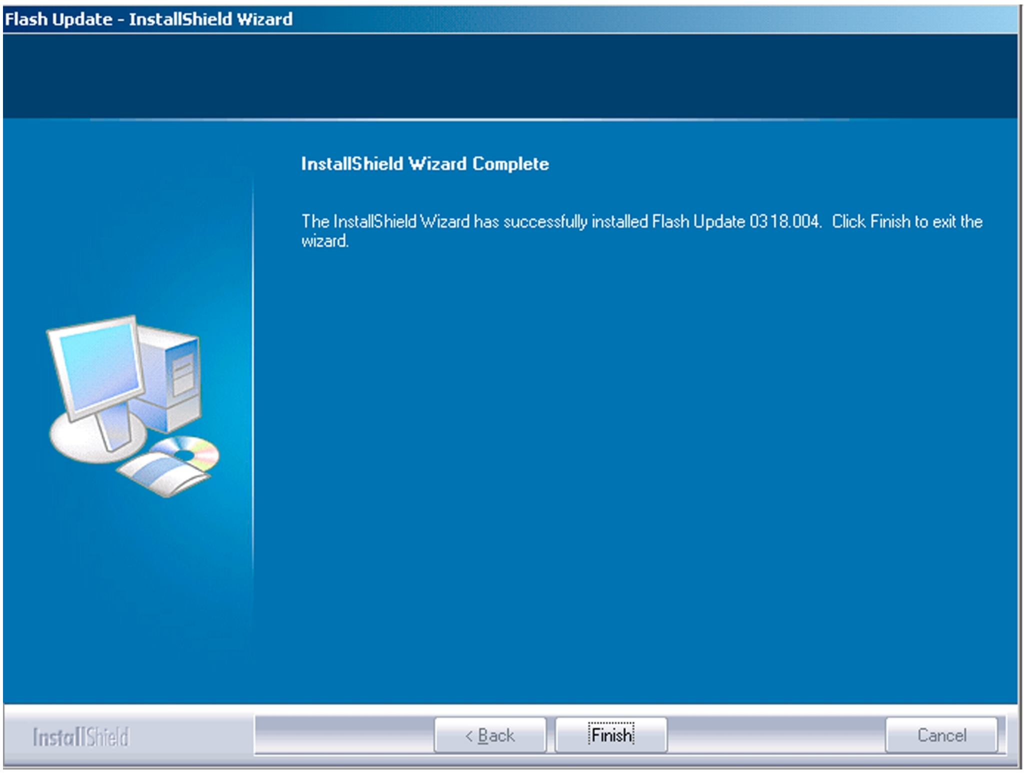
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.

Destination Folder: C:\Program Files\Nokia\Phoenix

Figure 26 Flash destination folder

When installing the flash update files for the first time, you may choose another location by selecting **Browse** (not recommended).

4. To complete the installation procedure, click **Finish** .



Flash Update - InstallShield Wizard
InstallShield
< Back
Finish
Cancel

InstallShield Wizard Complete

The InstallShield Wizard has successfully installed Flash Update 0318.004. Click Finish to exit the wizard.

Figure 27 Finish flash update

Next action

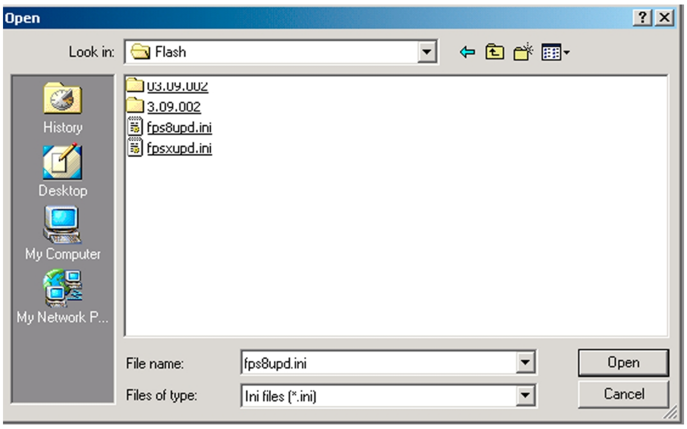
FPS-8 and FPS-10 flash prommers must be updated using *Phoenix*.

Updating FPS-8 and FPS-10 flash prommer software

Steps

1. Start *Phoenix* service software, and log in.
2. Choose the correct connection for your flash prommer: **File→Manage Connections...**
3. Choose **Flashing→Prommer maintenance** .

4. To update the **FPS-8/FPS-10** software, click **Update**, and select the appropriate file *fps8upd.ini* (for FPS-8) or *fpsxupd.ini* (for FPS-10) from *C:|Program Files|Nokia|Phoenix|Flash*.


Open
Look in:
Flash
History
Desktop
My Computer
My Network P...
03.09.002
3.09.002
fps8upd.ini
fpsxupd.ini
Open
Cancel

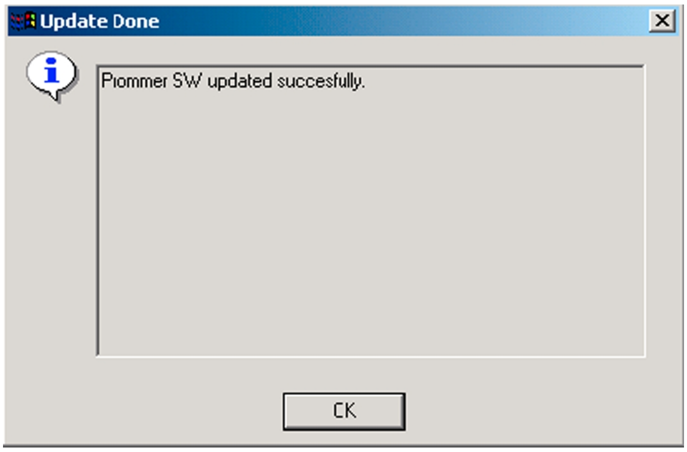
File name: fps8upd.ini

Files of type: Ini files (*.ini)

Figure 28 Flash directory window

Tip: All files can be loaded separately to the prommer used. To do this, click the right mouse button in the *Flash Box Files* pane and select the file type(s) to be loaded.

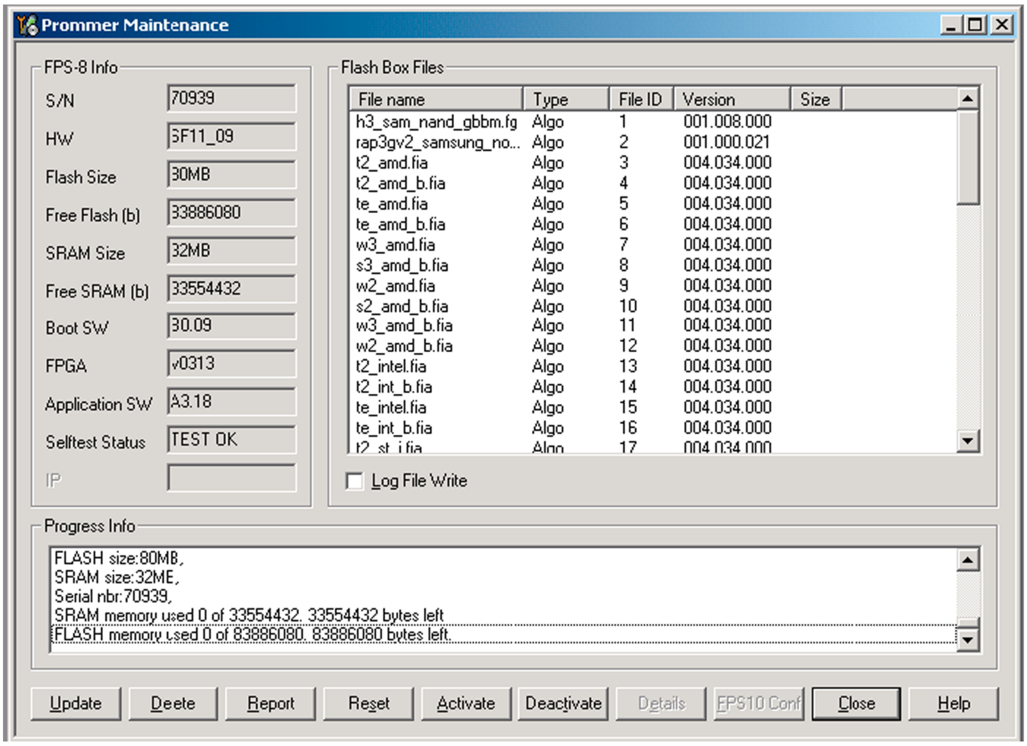
5. Click **OK**.


Update Done
OK

Prommer SW updated succesfully.

Figure 29 Prommer software update finished

6. To close the *Prommer Maintenance* window, click **Close**.



S/N: 70939
HW: SF11_09
Flash Size: 30MB
Free Flash (b): 33886080
SRAM Size: 32MB
Free SRAM (b): 33554432
Boot SW: 30.09
FPGA: v0313
Application SW: A3.18
Selftest Status: TEST OK
IP:

File name	Type	File ID	Version	Size
h3_sam_nand_gbbm.fg	Algo	1	001.008.000	
rap3gv2_samsung_no...	Algo	2	001.000.021	
t2_amd.fia	Algo	3	004.034.000	
t2_amd_b.fia	Algo	4	004.034.000	
te_amd.fia	Algo	5	004.034.000	
te_amd_b.fia	Algo	6	004.034.000	
w3_amd.fia	Algo	7	004.034.000	
s3_amd_b.fia	Algo	8	004.034.000	
w2_amd.fia	Algo	9	004.034.000	
s2_amd_b.fia	Algo	10	004.034.000	
w3_amd_b.fia	Algo	11	004.034.000	
w2_amd_b.fia	Algo	12	004.034.000	
t2_intel.fia	Algo	13	004.034.000	
t2_int_b.fia	Algo	14	004.034.000	
te_intel.fia	Algo	15	004.034.000	
te_int_b.fia	Algo	16	004.034.000	
t2_st_i.fia	Algo	17	004.034.000	

☐ Log File Write

```
FLASH size:80MB,
SRAM size:32ME,
Serial nbr:70939,
SRAM memory used 0 of 33554432. 33554432 bytes left
FLASH memory used 0 of 83886080. 83886080 bytes left.
```

Figure 30 *Prommer Maintenance* window

Activating FPS-8

Context

Before FPS-8 can be successfully used for phone programming, it must first be activated.

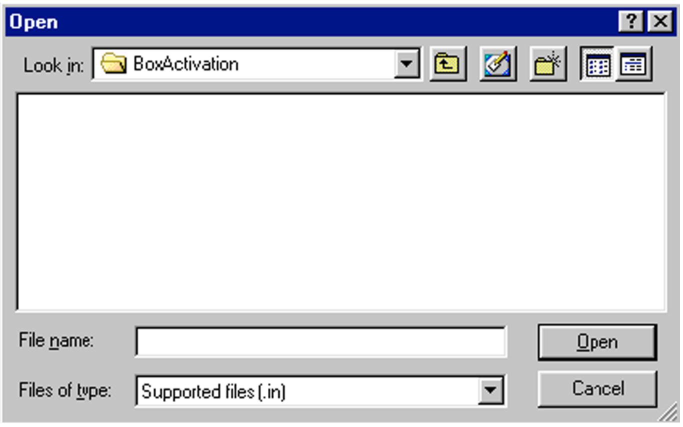
First fill in the *FPS-8 activation request* sheet in the FPS-8 sales package, and follow the instructions given.

When activation file is received (for example, *00000.in*), copy it to the *C:|ProgramFiles|Nokia|Phoenix |BoxActivation* directory on your computer (this directory is created when *Phoenix* is installed).

Steps

1. Start *Phoenix* service software.
2. Choose **Flashing→Prommer Maintenance** .
3. In the *Prommer Maintenance* window, click **Activate**.
4. To find the activation file, click **Browse**.

5. To activate the prommer, select the activation file and click **Open**.



Look in: BoxActivation

File name:

Files of type: Supported files (.in)

Figure 31 Box activation

6. To complete the activation, restart FPS-8.

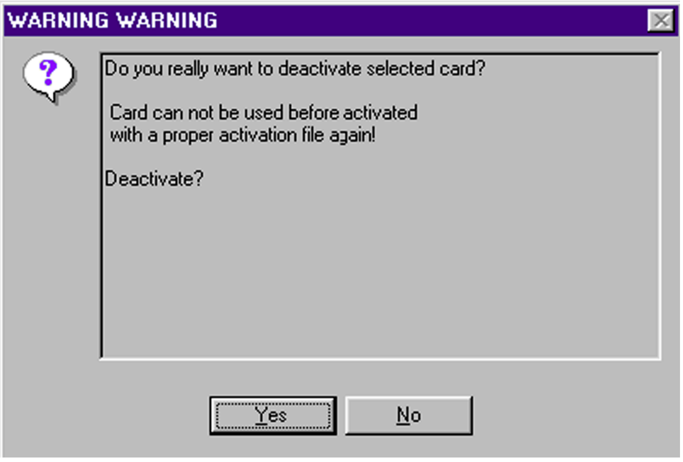
Deactivating FPS-8

Context

If there is, for example, a need to send the FPS-8 box for repair, it must be deactivated first.

Steps

1. Start *Phoenix* service software.
2. Choose **Flashing**→**Prommer Maintenance** .
3. In the *Prommer Maintenance* window, click **Deactivate**.
4. To confirm the deactivation, click **Yes**.



Do you really want to deactivate selected card?

Card can not be used before activated
with a proper activation file again!

Deactivate?

Figure 32 Deactivation warning

The box is deactivated.

5. To complete the deactivation, restart FPS-8.

4 — Service Tools and Service Concepts

(This page left intentionally blank.)

Table of Contents

Service tools....4–5
  CA-31D....4–5
  CA-35S....4–5
  CA-53....4–5
  CU-4....4–6
  FLS-4S....4–7
  FPS-10....4–7
  FS-6....4–7
  JBT-9....4–8
  MJ-76....4–8
  PCS-1....4–8
  PKD-1....4–8
  RF shield box....4–9
  RJ-104....4–9
  RJ-114....4–9
  RJ-56....4–9
  RJ-73....4–9
  RJ-88....4–10
  SA-92....4–10
  SPS-1....4–10
  SRT-6....4–10
  SS-45....4–11
  SS-46....4–11
  SS-51....4–11
  SS-62....4–7
  ST-21....4–11
  ST-22....4–12
  ST-37....4–12
  ST-41....4–12
  ST-42....4–12
  ST-44....4–12
  SX-4....4–13
  XCS-4....4–13
  XRF-1....4–13
Service concepts....4–14
  Flash concept with FPS-10....4–14
  MJ-76 module jig concept....4–15
  POS (Point of Sale) flash concept....4–16
  RF testing and BB testing....4–17
  CU-4 flash concept with FPS-10....4–18
  Service concept for RF/BB testing and tuning....4–19
  LAN connection flash concept....4–20

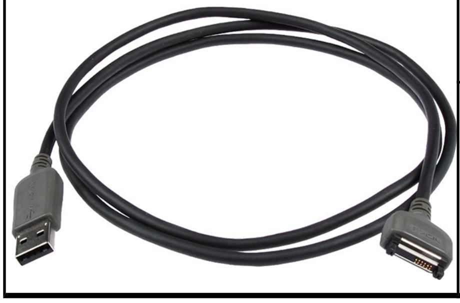
List of Figures

Figure 33 Basic flash concept with FPS-10....4–14
Figure 34 MJ-76 module jig service concept....4–15
Figure 35 POS flash concept....4–16
Figure 36 RF testing and BB testing....4–17
Figure 37 CU-4 flash concept with FPS-10....4–18

Figure 38 Service concept for RF/BB testing and tuning........4–19
Figure 39 LAN connection flash concept........4–20

Service tools

The table below gives a short overview of service tools that can be used for testing, error analysis and repair of product RM-78, refer to various concepts.

<table>
<tr><td rowspan="2"> </td><td>CA-31D</td><td>USB cable</td><td></td></tr>
<tr><td colspan="3">The CA-31D USB cable is used to connect FPS-10 or FPS-11 to a PC. It is included in the FPS-10 and FPS-11 sales packages.</td></tr>
<tr><td rowspan="2"> </td><td>CA-35S</td><td>Power cable</td><td></td></tr>
<tr><td colspan="3">CA-35S is a power cable for connecting, for example, the FPS-10 flash prommer to the Point-Of-Sales (POS) flash adapter.</td></tr>
<tr><td rowspan="2"></td><td>CA-53</td><td>USB connectivity cable</td><td></td></tr>
<tr><td colspan="3">USB to Pop-Port^{TM} connector cable.</td></tr>
</table>

CU-4	Control unit	

CU-4 is a general service tool used with a module jig and/or a flash adapter. It requires an external 12 V power supply.

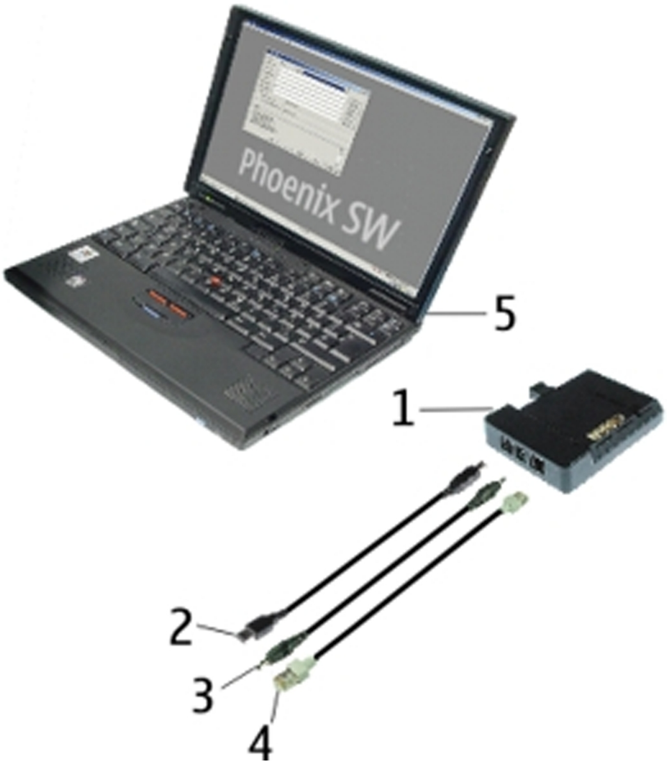
The unit has the following features:

- software controlled via USB
- EM calibration function
- Forwards FBUS/Flashbus traffic to/from terminal
- Forwards USB traffic to/from terminal
- software controlled BSI values
- regulated VBATT voltage
- 2 x USB2.0 connector (Hub)
- FBUS and USB connections supported

When using CU-4, note the special order of connecting cables and other service equipment:

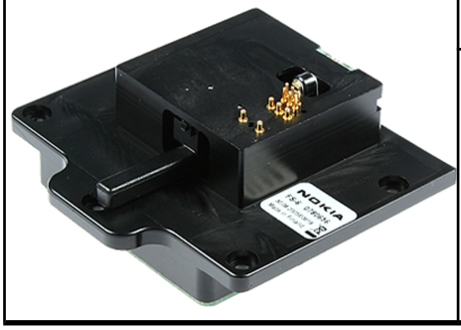
Instructions

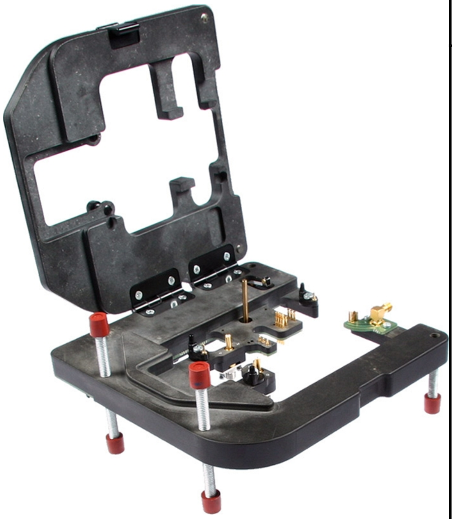
1. Connect a service tool (jig, flash adapter) to CU-4.
2. Connect CU-4 to your PC with a USB cable.
3. Connect supply voltage (12 V)
4. Connect an FBUS cable (if necessary).
5. Start Phoenix service software.

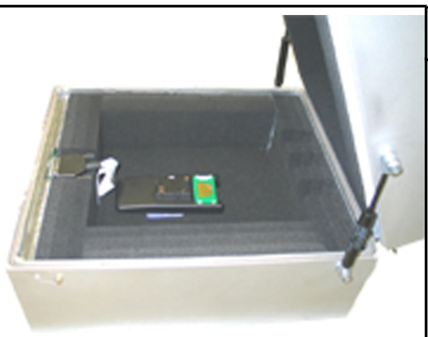
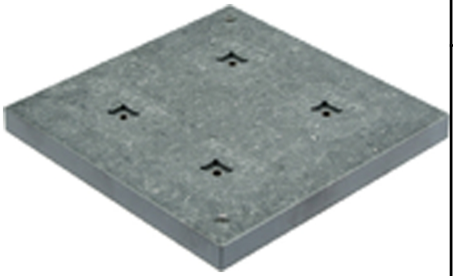
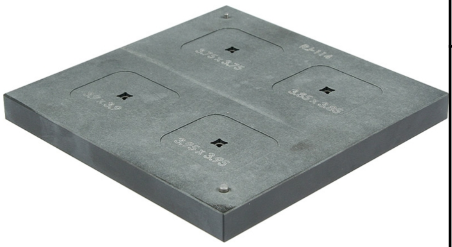
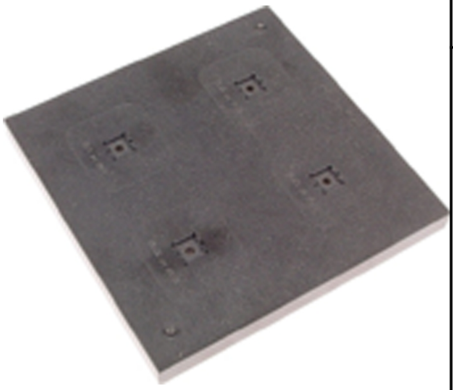


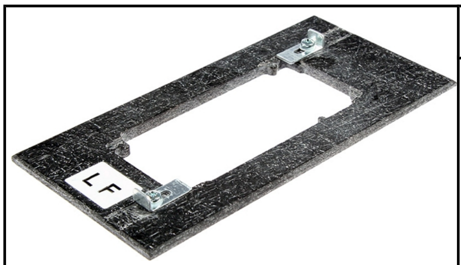
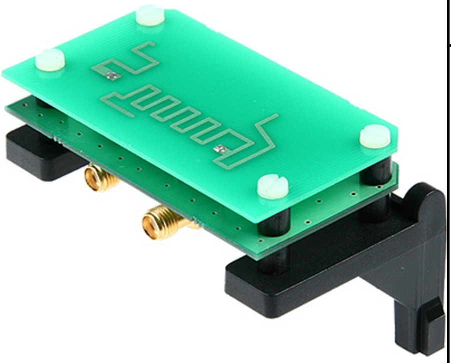
Note: Phoenix enables CU-4 regulators via USB when it is started.

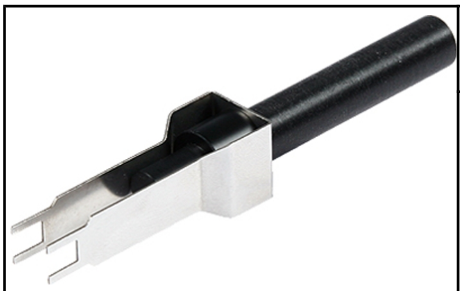
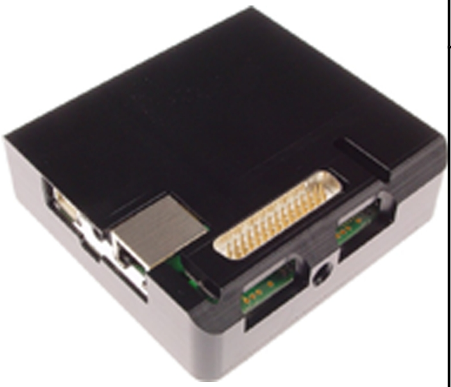
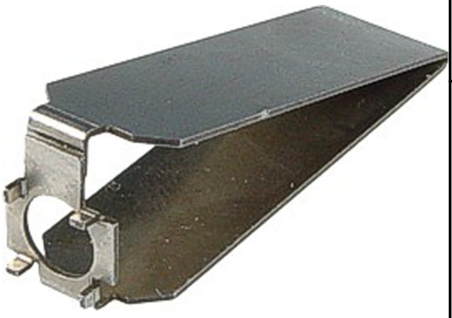
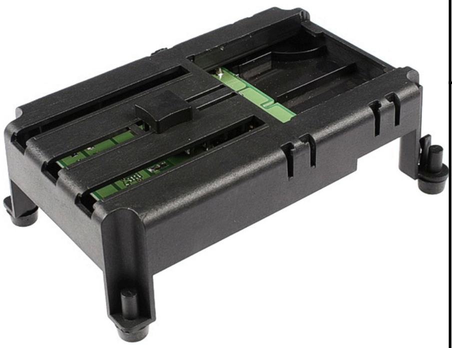
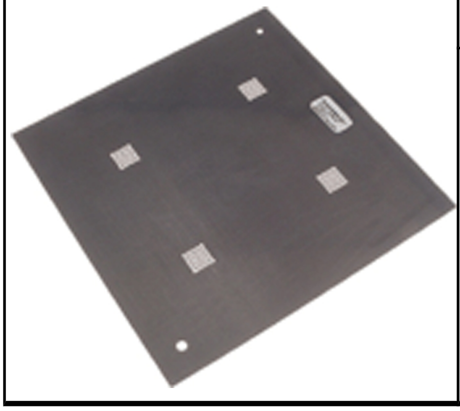
Reconnecting the power supply requires a Phoenix restart.

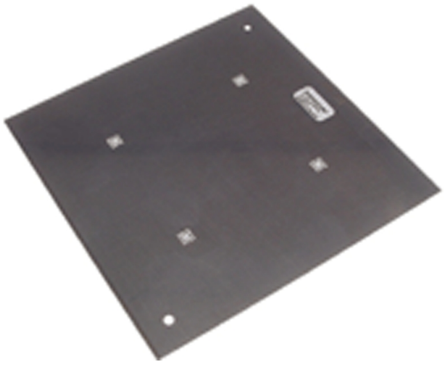
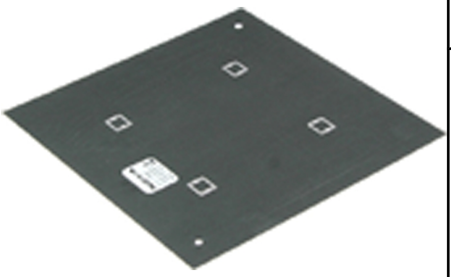
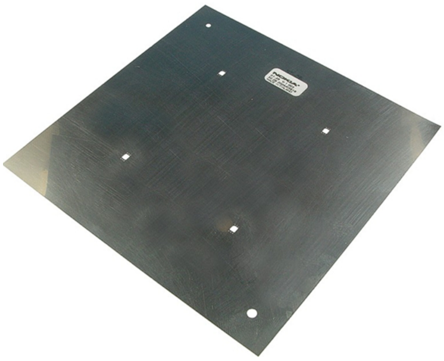
NOKIA FLS-4S	FLS-4S	Flash device	
	FLS-4S is a dongle and flash device incorporated into one package, developed specifically for POS use.		
	FPS-10	Flash prommer	
	FPS-10 interfaces with: • PC • Control unit • Flash adapter • Smart card FPS-10 flash prommer features: • Flash functionality for BB5 and DCT-4 terminals • Smart Card reader for SX-2 or SX-4 • USB traffic forwarding • USB to FBUS/Flashbus conversion • LAN to FBUS/Flashbus and USB conversion • Vusb output switchable by PC command FPS-10 sales package includes: • FPS-10 prommer • Power Supply with 5 country specific cords • USB cable		
	FS-6	Flash adapter	
	• FS-6 is equipped with a clip interlock system • provides standardised interface towards Control Unit • provides RF connection using coupler • multiplexing between USB and FBUS media, controlled by VUSB		

	JBT-9	Bluetooth test and interface box (sales package)	
	The JBT-9 test box is a generic service device used to perform Bluetooth bit error rate (BER) testing, and establishing cordless FBUS connection via Bluetooth. An ACP-8x charger is needed for BER testing and an AXS-4 cable in case of cordless interface usage testing . Sales package includes: • JBT-9 test box • Installation and warranty information		
	MJ-76	Module jig	
	MJ-76 is meant for component level troubleshooting. The jig includes an RF interface for GSM, WCDMA and Bluetooth. In addition, it has the following features: • Provides mechanical interface with the engine module • Provides galvanic connection to all needed test pads in module • Multiplexing between USB and FBUS media, controlled by Vusb • MMC interface • Duplicated SIM connector • Connector for control unit • Access for Pop-Port^{TM} system connector		
	PCS-1	Power cable	
	The PCS-1 power cable (DC) is used with a docking station, a module jig or a control unit to supply a controlled operating voltage.		
	PKD-1	SW security device	
	SW security device is a piece of hardware enabling the use of the service software when connected to the parallel (LPT) port of the PC. Without the device, it is not possible to use the service software. Printer or any such device can be connected to the PC through the device if needed.		

		RF shield box	Because the WCDMA network disturbs the RX side testing of the WCDMA phone and the Tx signal of the WCDMA phone can severely disturb the WCDMA network, a shield box is needed in all testing, tuning and fault finding which requires WCDMA RF signal. The shield box is not an active device, it contains only passive filtering components for RF attenuation.
	RJ-104	BTHFM rework jig	RJ-104 is a rework jig used when servicing the BTHFM module. It is used together with rework stencil ST-37.
	RJ-114	Rework jig	RJ-114 is a rework jig used with ST-41.
	RJ-56	Rework jig	RJ-56 is a rework jig used with ST-21.
	RJ-73	Rework jig	RJ-73 is a rework jig used with ST-42.

<table>
<tr><td rowspan="2"></td><td>RJ-88</td><td>Soldering jig</td><td></td></tr>
<tr><td colspan="3">RJ-88 is a soldering jig used for soldering and as a rework jig for the engine module.</td></tr>
<tr><td rowspan="2"></td><td>SA-92</td><td>RF coupler</td><td></td></tr>
<tr><td colspan="3">SA-92 is an RF coupler for WCDMA and GSM RF testing. It is used together with the product-specific flash adapter.
The following table shows attenuations from the antenna pads of the mobile terminal to the SMA connectors of SA-92:
•
<table>
<tr><th>Frequency</th><th>Att. (dB)</th></tr>
<tr><td>GSM900 TX</td><td>2,7 dB +/- 0,5 dB</td></tr>
<tr><td>GSM900 RX</td><td>2,6 dB +/- 0,7 dB</td></tr>
<tr><td>GSM1800 TX</td><td>8,2 dB +/- 2,0 dB</td></tr>
<tr><td>GSM1800 RX</td><td>5,3 dB +/- 0,4 dB</td></tr>
<tr><td>GSM1900 TX</td><td>5,1 dB +/- 0,1dB</td></tr>
<tr><td>GSM1900 RX</td><td>5,2 dB +/- 0,6 dB</td></tr>
<tr><td>WCDMA2100 TX</td><td>10,0 dB +/- 0,9dB</td></tr>
<tr><td>WCDMA2100 RX</td><td>6,8 dB +/- 0,4 dB</td></tr>
</table></td></tr>
<tr><td rowspan="2"> </td><td>SPS-1</td><td>Soldering Paste Spreader</td><td></td></tr>
<tr><td colspan="3"></td></tr>
<tr><td rowspan="2"> </td><td>SRT-6</td><td>Opening tool</td><td></td></tr>
<tr><td colspan="3"></td></tr>
</table>

<table>
<tr><td rowspan="2"></td><td>SS-45</td><td>Front camera removal tool</td><td></td></tr>
<tr><td colspan="3">The front camera removal tool SS-45 is used to remove/attach the front camera module from/to the socket.</td></tr>
<tr><td rowspan="2"></td><td>SS-46</td><td>Interface adapter</td><td></td></tr>
<tr><td colspan="3">SS-46 acts as an interface adapter between a product-specific flash adapter and FPS-10.</td></tr>
<tr><td rowspan="2"></td><td>SS-51</td><td>Front camera removal tool</td><td></td></tr>
<tr><td colspan="3">The front camera removal tool SS-51 is used to remove/attach a front camera module from/to the camera socket of the phone PWB.</td></tr>
<tr><td rowspan="2"></td><td>SS-62</td><td>Generic flash adapter base for BB5</td><td></td></tr>
<tr><td colspan="3">• generic base for flash adapters and couplers
• SS-62 equipped with a clip interlock system
• provides standardised interface towards Control Unit
• provides RF connection using galvanic connector or coupler
• multiplexing between USB and FBUS media, controlled by VUSB</td></tr>
<tr><td rowspan="2"></td><td>ST-21</td><td>Rework stencil</td><td></td></tr>
<tr><td colspan="3">ST-21 is a rework stencil used with rework jig RJ-56.</td></tr>
</table>

<table>
<tr><td rowspan="2"></td><td>ST-22</td><td>Rework stencil</td><td></td></tr>
<tr><td colspan="3">ST-22 is a rework stencil used with rework jig RJ-57.</td></tr>
<tr><td rowspan="2"></td><td>ST-37</td><td>BTHFM rework stencil</td><td></td></tr>
<tr><td colspan="3">ST-37 stencil is used with RJ-104 BTHFM rework jig.</td></tr>
<tr><td rowspan="2"> </td><td>ST-41</td><td>Rework stencil</td><td></td></tr>
<tr><td colspan="3">ST-41 is a rework stencil used with rework jig RJ-114.</td></tr>
<tr><td rowspan="2"></td><td>ST-42</td><td>Rework stencil</td><td></td></tr>
<tr><td colspan="3">ST-42 is a rework stencil used with rework jig RJ-73.</td></tr>
<tr><td rowspan="2"> </td><td>ST-44</td><td>Rework stencil</td><td></td></tr>
<tr><td colspan="3">ST-44 is a rework stencil used with rework jig RJ-57.</td></tr>
</table>

<table>
<tr><td rowspan="2"> </td><td>SX-4</td><td>Smart card</td><td></td></tr>
<tr><td colspan="3">SX-4 is a BB5 security device used to protect critical features in tuning and testing.
SX-4 is also needed together with FPS-10 when DCT-4 phones are flashed.</td></tr>
<tr><td rowspan="2"> </td><td>XCS-4</td><td>Modular cable</td><td></td></tr>
<tr><td colspan="3">XCS-4 is a shielded (one specially shielded conductor) modular cable for flashing and service purposes.</td></tr>
<tr><td rowspan="2"> </td><td>XRF-1</td><td>RF cable</td><td></td></tr>
<tr><td colspan="3">The RF cable is used to connect, for example, a module repair jig to the RF measurement equipment.
SMA to N-Connector ca. 610mm.
Attenuation for:
• GSM850/900: 0.3+-0.1 dB
• GSM1800/1900: 0.5+-0.1 dB
• WLAN: 0.6+-0.1dB</td></tr>
</table>

Service concepts

Flash concept with FPS-10

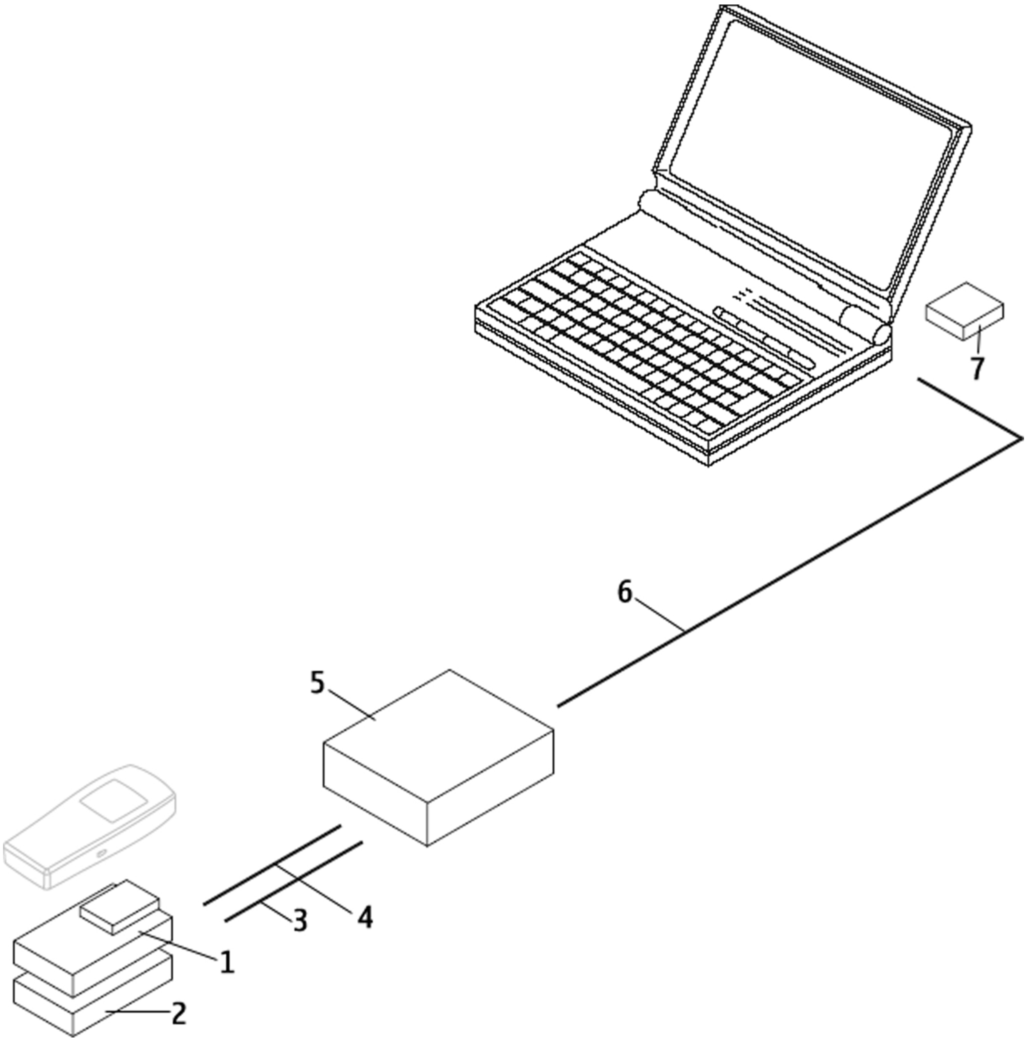
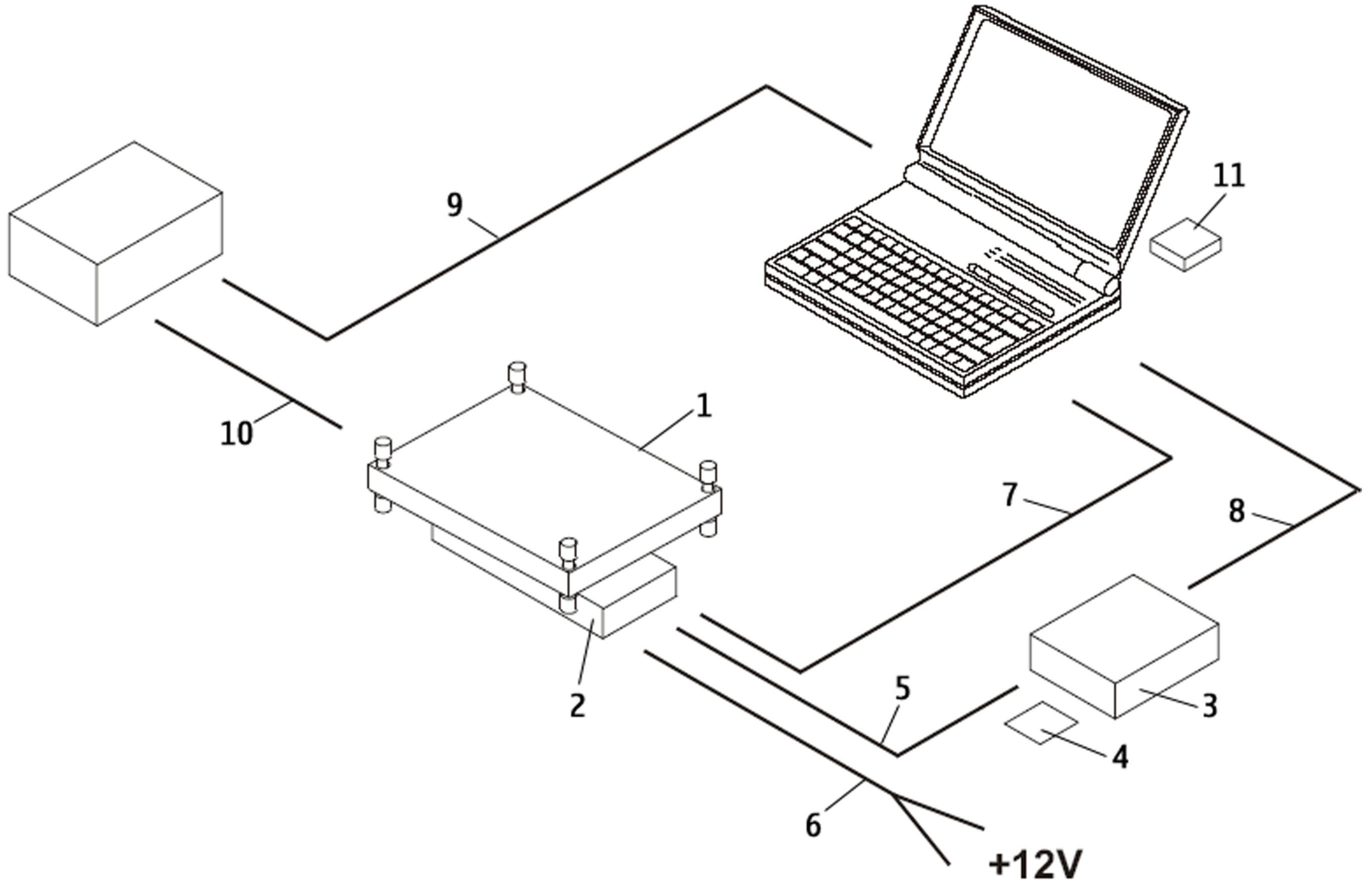


Figure 33 Basic flash concept with FPS-10

Note: FPS-8 concept can also be used for flashing.

Item	Type	Description
1	FS-6	Flash adapter
2	SS-46	Interface adapter
3	CA-35S	Power cable
4	XCS-4	Modular cable
5	FPS-10	Flash prommer box
6		Standard USB cable
7	PKD-1	SW security device

MJ-76 module jig concept



Legend

Module jig concept is meant for BB / RF testing + tuning and for flashing purposes.

Figure 34 MJ-76 module jig service concept

Item	Type	Description
1	MJ-76	Module jig
2	CU-4	Control unit
3	FPS-10	Flash prommer box
4	SX-4	Smart card
5	XCS-4	Modular cable
6	PCS-1	DC power cable
7		Standard USB cable
8		Standard USB cable
9		GPIB control cable
10	XRS-6	RF cable
11	PKD-1	SW security device

Item	Type	Description
12		RF shield box

Note: Item 12 not shown in the picture.

POS (Point of Sale) flash concept

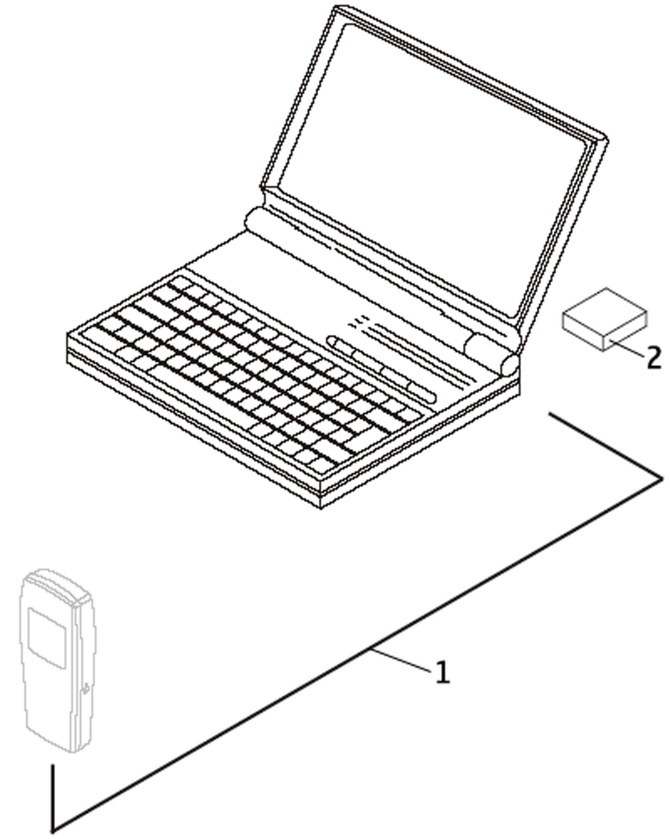


Figure 35 POS flash concept

Item	Type	Description
1	CA-53	USB connectivity cable
2	FLS-4S	POS flash device

RF testing and BB testing

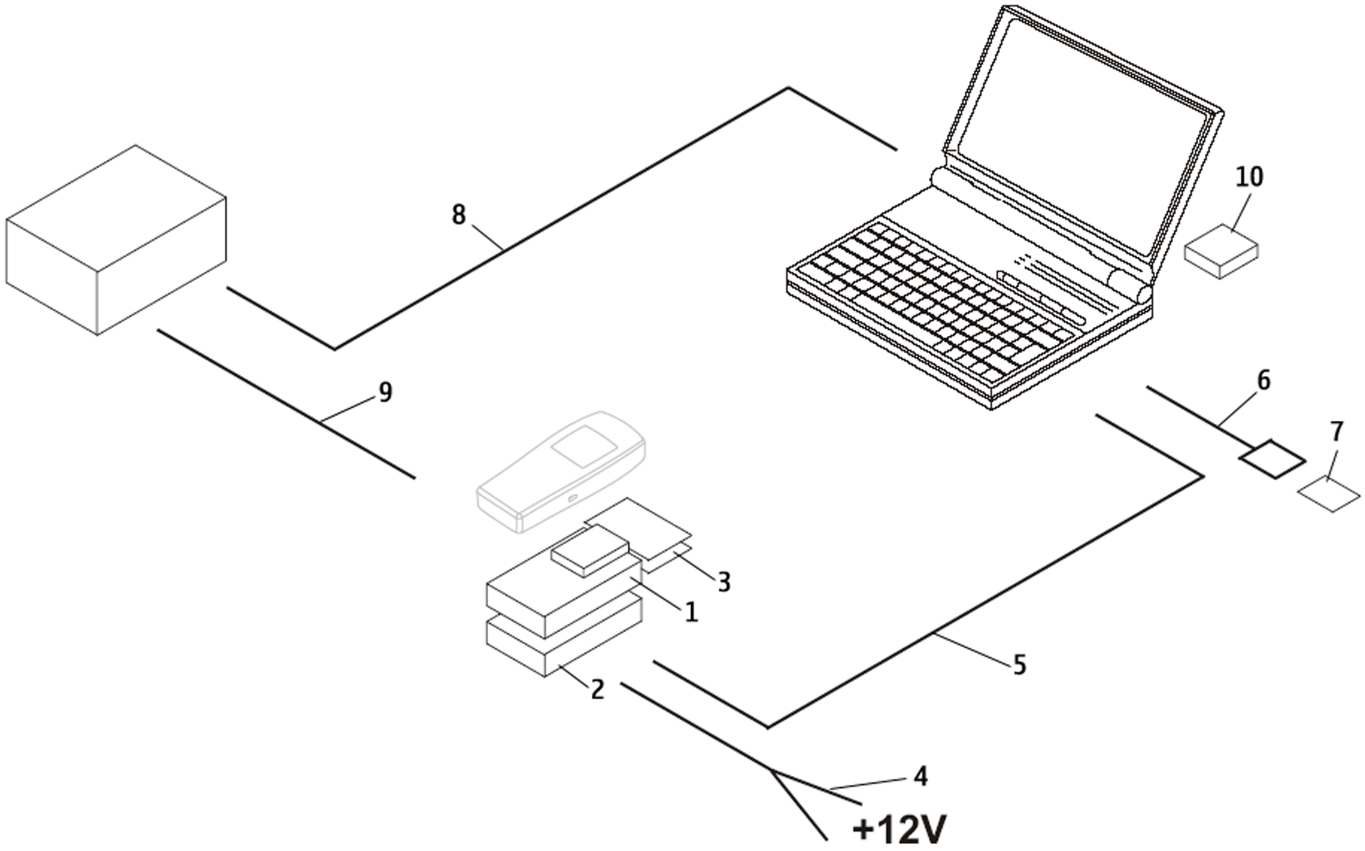


Figure 36 RF testing and BB testing

Item	Type	Description
1	SS-62 FS-6	Flash adapter base Flash adapter
2	CU-4	Control unit
3	SA-92	RF coupler
4	PCS-1	Power cable
5		Standard USB cable
6		Standard USB cable + smart card reader
7	SX-4	Smart card
8		GPIB control cable
9	XRS-6	RF cable
10	PKD-1	SW security device
11		RF shield box

Note: Item 11 is not shown in the figure.

CU-4 flash concept with FPS-10

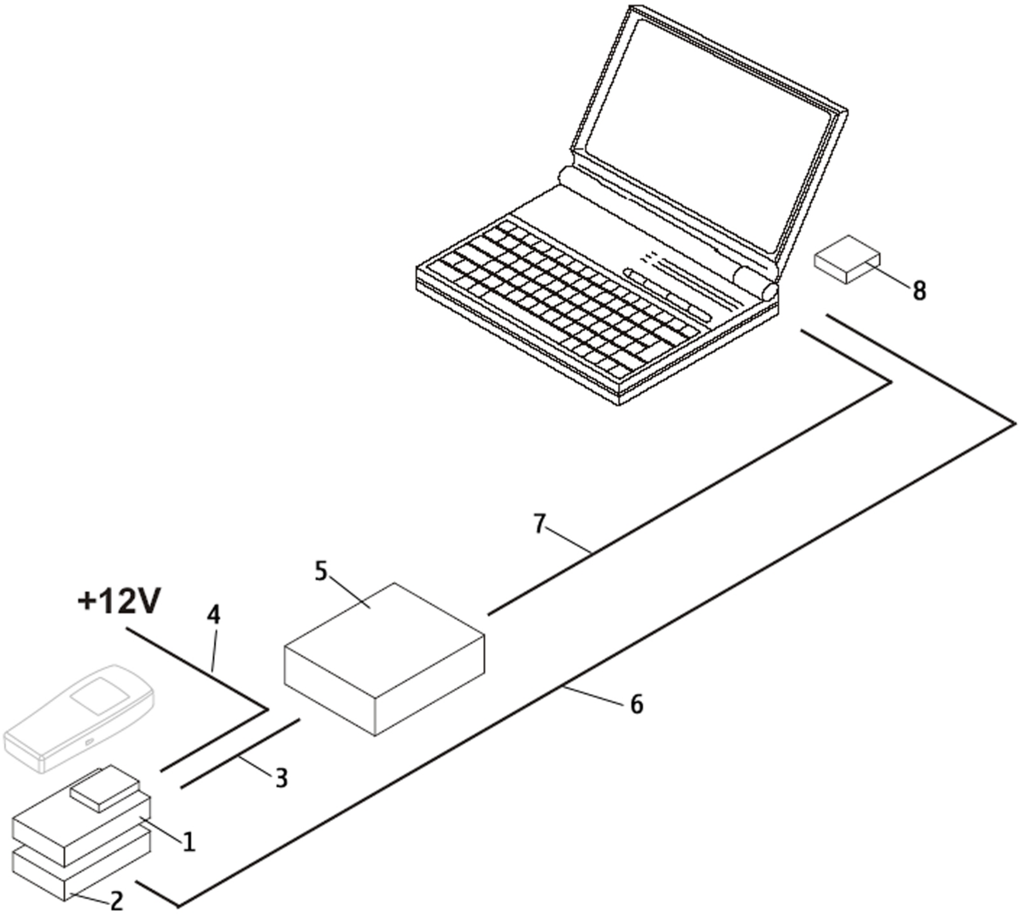


Figure 37 CU-4 flash concept with FPS-10

Note: FPS-8 concept can also be used for flashing.

Item	Type	Description
1	SS-62 FS-6	Flash adapter base Flash adapter
2	CU-4	Control unit
3	XCS-4	Modular cable
4	PCS-1	Power cable
5	FPS-10	Flash prommer box
6		Standard USB cable
7		Standard USB cable
8	PKD-1	SW security device

Service concept for RF/BB testing and tuning

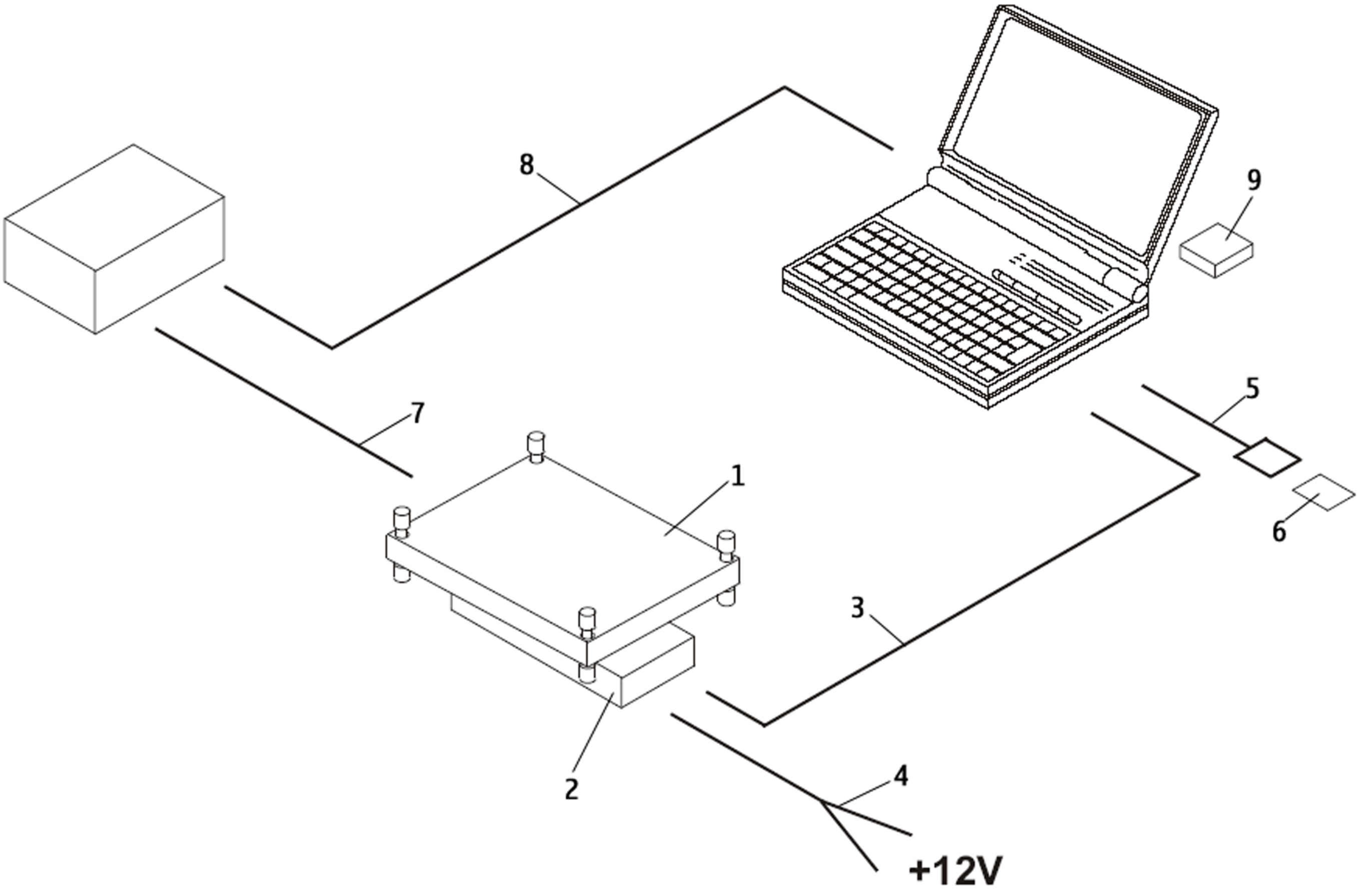


Figure 38 Service concept for RF/BB testing and tuning

Item	Type	Description
1	MJ-76	Module jig
2	CU-4	Control unit
3		Standard USB cable
4	PCS-1	DC power cable
5		Standard USB cable + smart card reader
6	SX-4	Smart card
7	XRS-6	RF cable
8		GPIB control cable
9	PKD-1	SW security device
10		RF shield box

Note: Item 10 not shown in the picture.

LAN connection flash concept

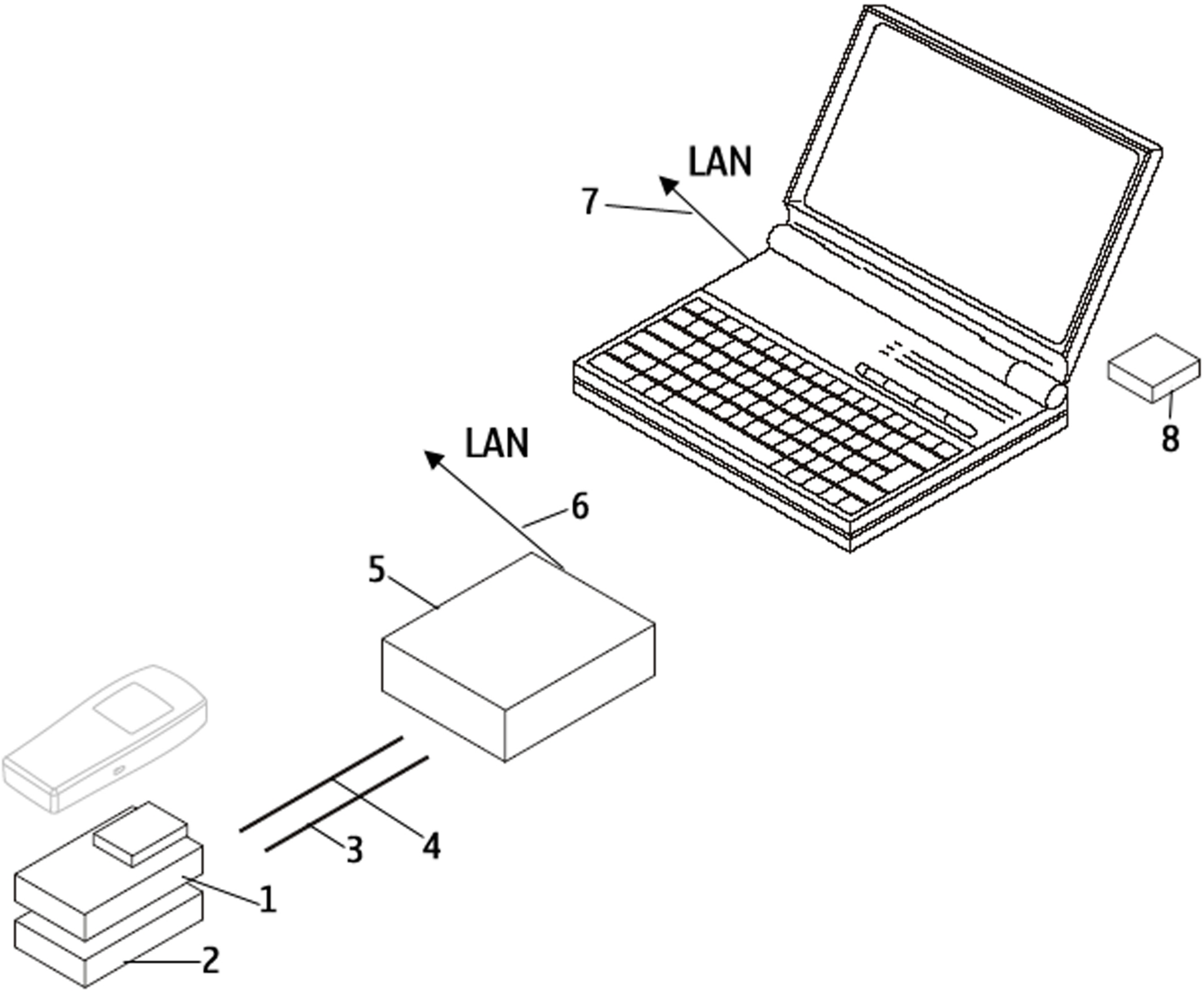


Figure 39 LAN connection flash concept

Item	Type	Description
1	SS-62 FS-6	Flash adapter base Flash adapter
2	SS-46	Interface adapter
3	CA-35S	Power cable
4	XCS-4	Modular cable
5	FPS-10	Flash prommer box
6		LAN cable
7		LAN cable
8	PKD-1	SW security device

5 — Disassembly and reassembly instructions

(This page left intentionally blank.)

Table of Contents

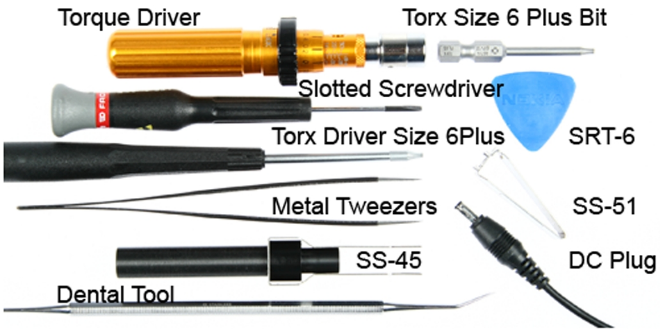
Disassembly instructions (Upper part)........5–5
Reassembly instructions (Upper part)........5–10
Disassembly instructions (Lower part)........5–11
Reassembly instructions (Lower part)........5–15

(This page left intentionally blank.)

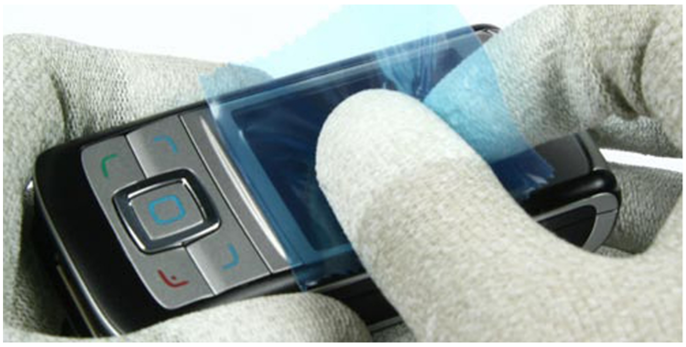
Disassembly instructions (Upper part)

Steps

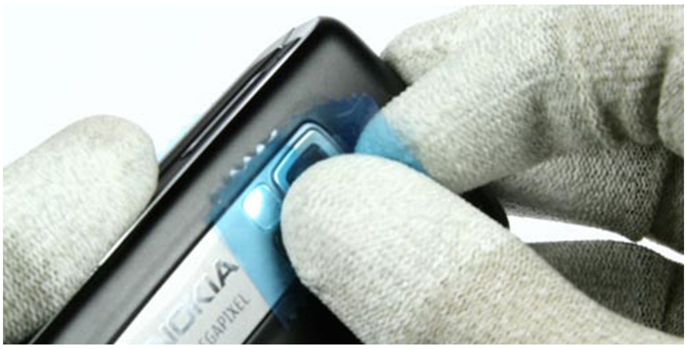
1. You need the following tools.


Torque Driver
Torx Size 6 Plus Bit
Slotted Screwdriver
Torx Driver Size 6Plus
SRT-6
Metal Tweezers
SS-51
SS-45
DC Plug
Dental Tool

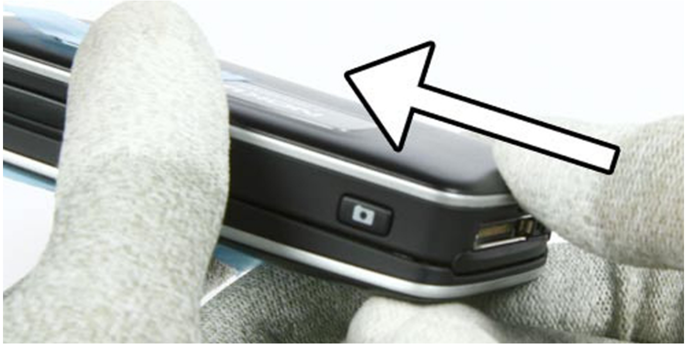
2. Protect the window with a plastic film



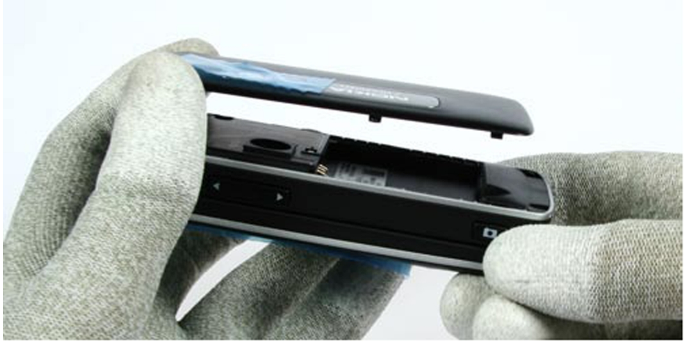
3. Protect the camera window with a plastic film.



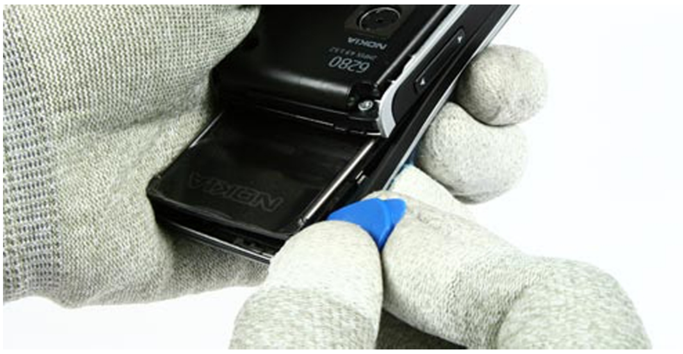
4. Release the **B-cover**.



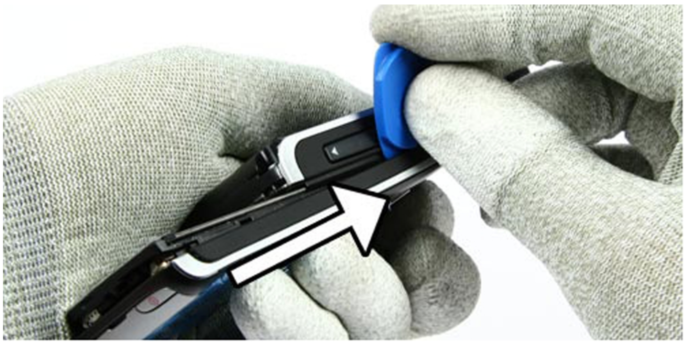
5. Remove the **Battery cover**. Ensure that no battery is inserted before you continue.



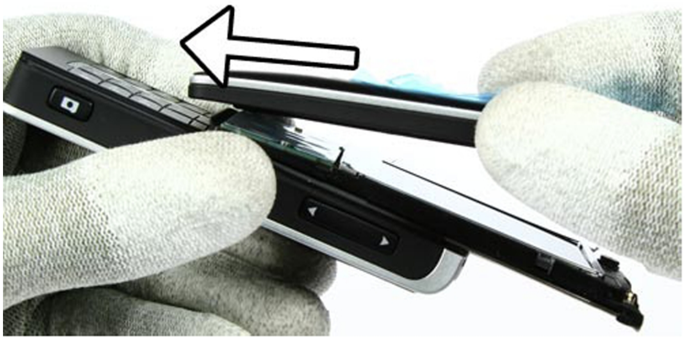
6. Shift out the unit. Release the clips of the top side first.



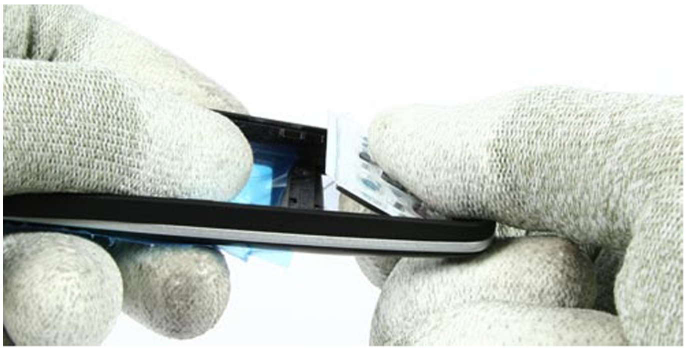
7. Slide along on both sides of the **A-cover** to release all clips.



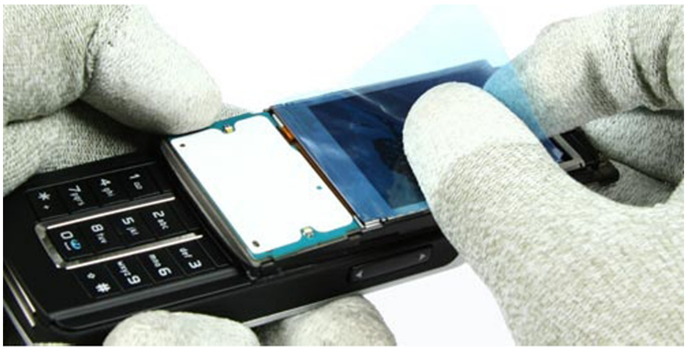
8. Lift up the **A-cover**.



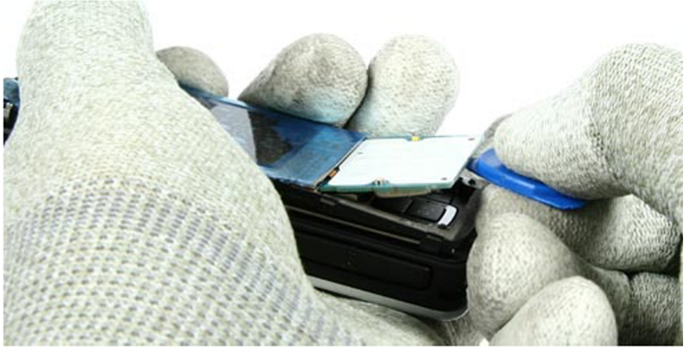
9. Protect the innerside window with a plastic film. Remove the **keymat** as shown.



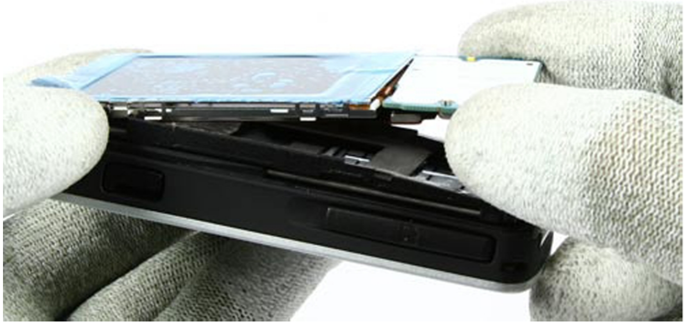
10. Protect the LCD with a plastic film.



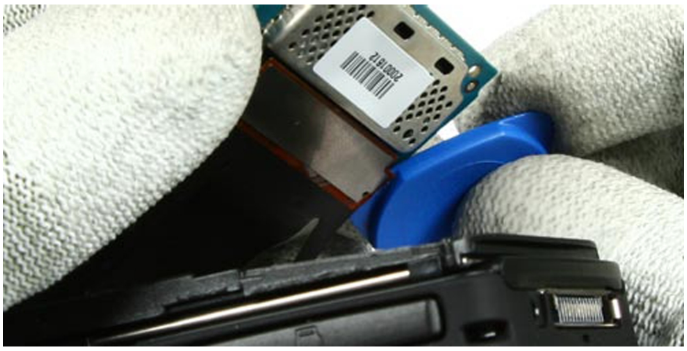
11. Shift together the unit. Lift up the glued **UI PWB assy** carefully with the SRT-6.



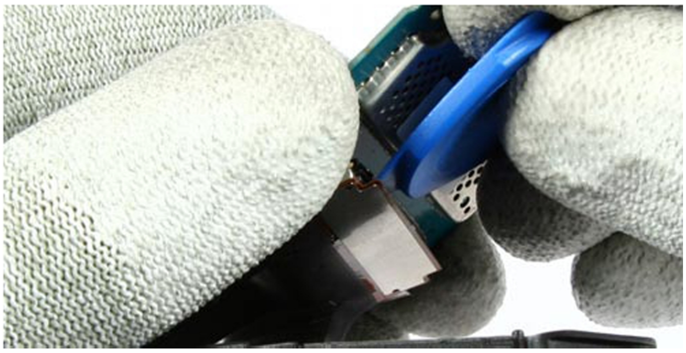
12. Lift the UI PWB together with the LCD module.



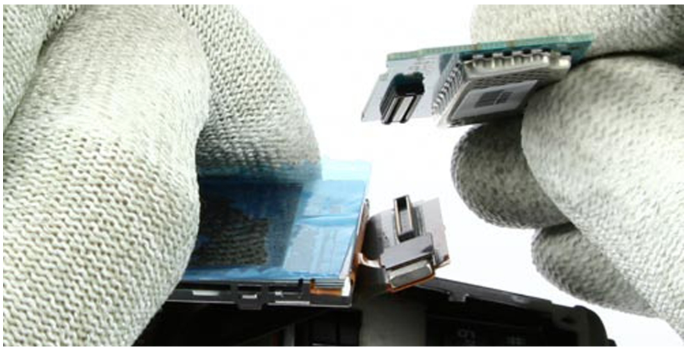
13. Carefully release the flex connector at one side first.



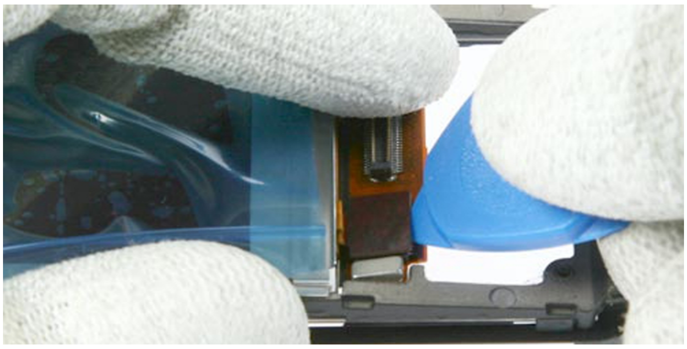
14. Now release the other side of the flex connector..



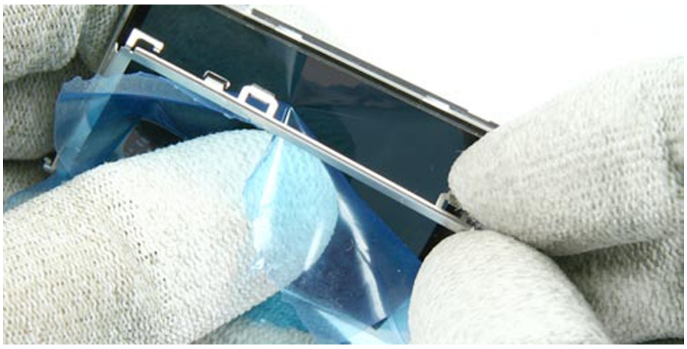
15. Take away the UI PWB assy.



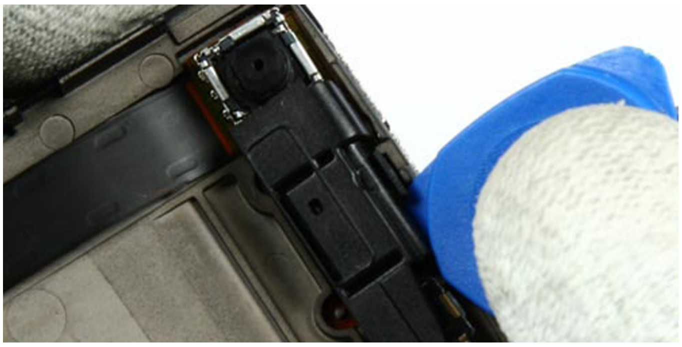
16. Release the connector of the LCD module carefully while fixing the flex foil. Remove the LCD module now.



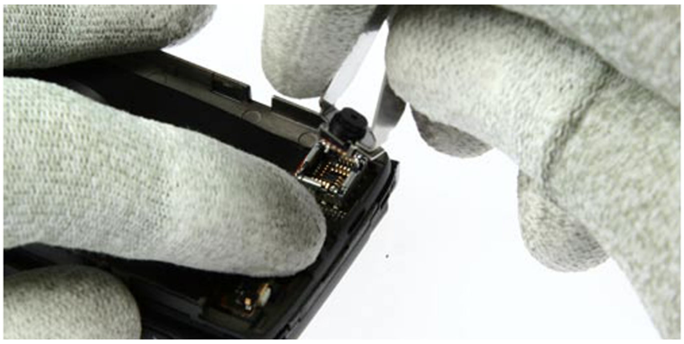
17. Separate the **LCD module** from the **Display metal shield**.



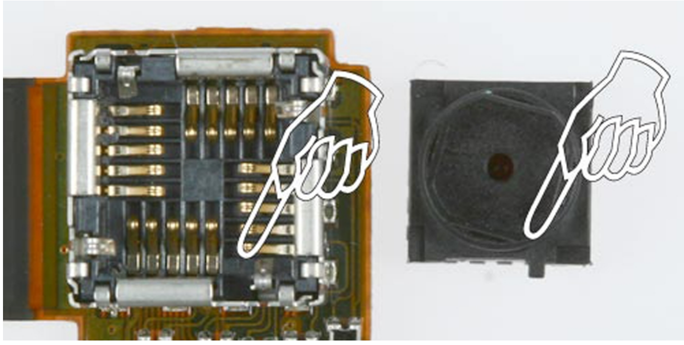
18. Release the **Camera guide assy** with the SRT-6.



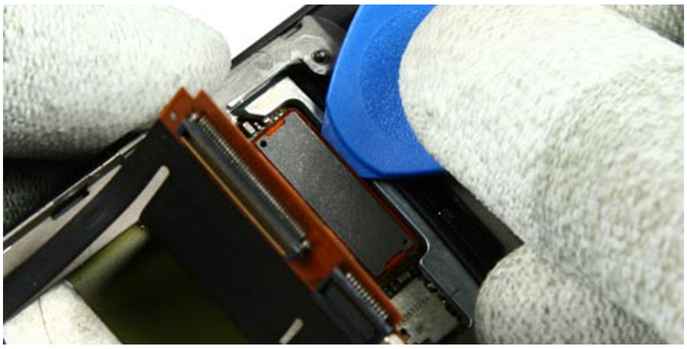
19. Release the **VGA camera** with the SS-51. Fix the **Main flex** near the camera socket while removing the camera.



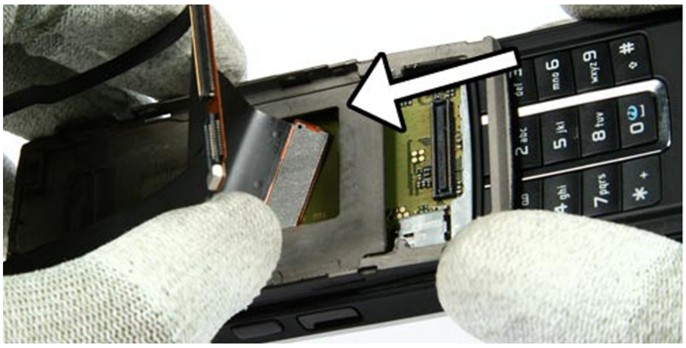
20. For assembly: **mind the correct positioning of the VGA camera.**



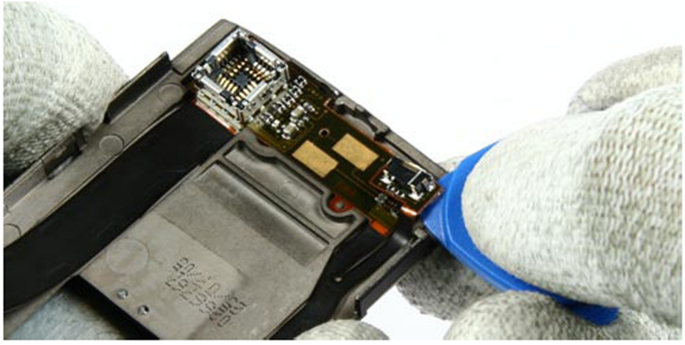
21. Shift the unit into mid position. Release the connector of the **main flex assy**.



22. Slot the flex connector through the **C-cover assy** carefully.



23. Lift the glued **Power switch** carefully.



Reassembly instructions (Upper part)

Steps

1. For reassembly, follow the Disassembly instructions, but *in reversed order*

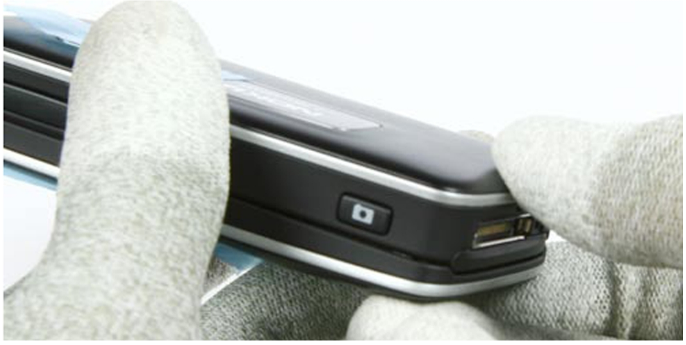
Note: Pay special attention to step 20.

Note: For reassembly, ALWAYS USE NEW SCREWS.

Disassembly instructions (Lower part)

Steps

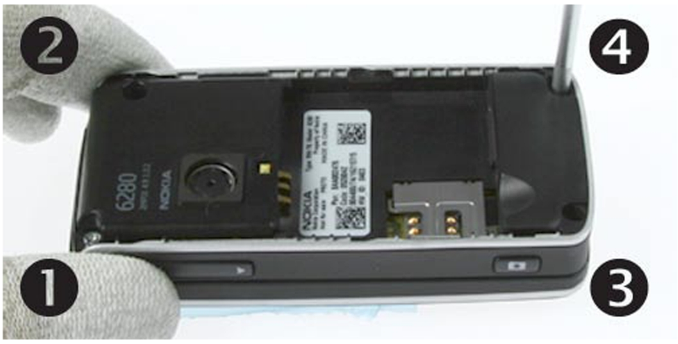
1. Open the **B-cover** by pressing it from the bottom side.



2. Ensure that no battery is inserted.

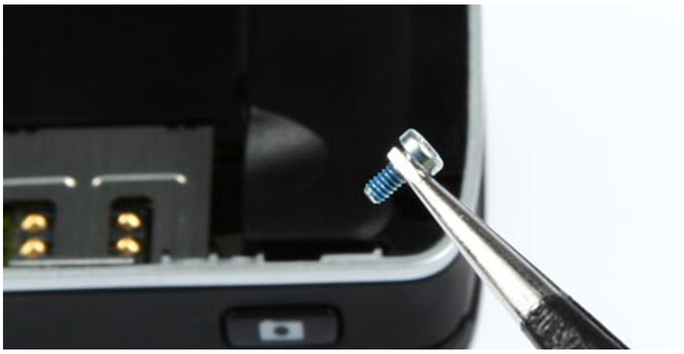
3. Unscrew all screws in the shown order.

   Note: For assembly use the reverse order and a torque of 25 Ncm.

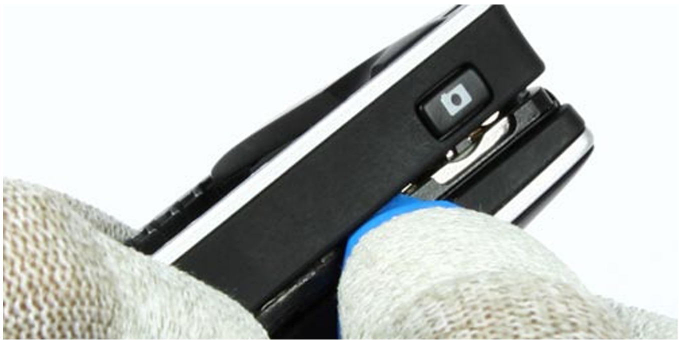


4. Once removed, the screws can't be used again.

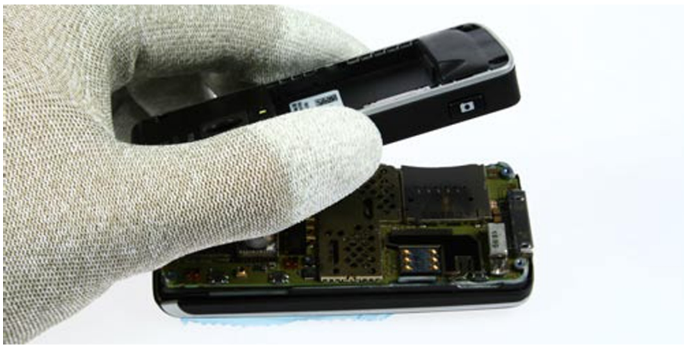
   Note: Always use new screws for assembly!



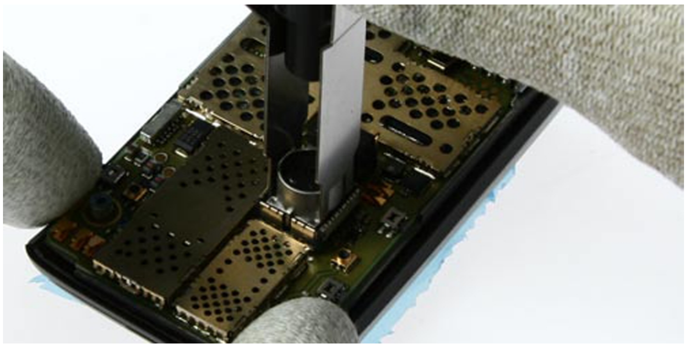
5. Release the clips of the **D-cover**.



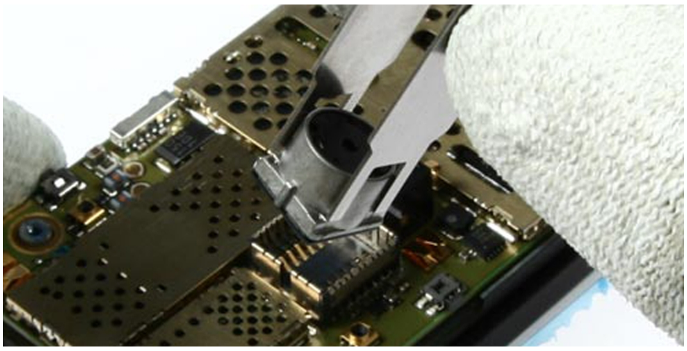
6. Remove the D-cover.



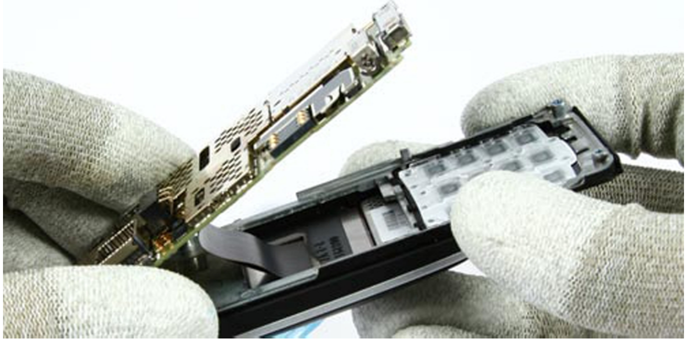
7. Remove the SMIA CAmera with the SS-45.



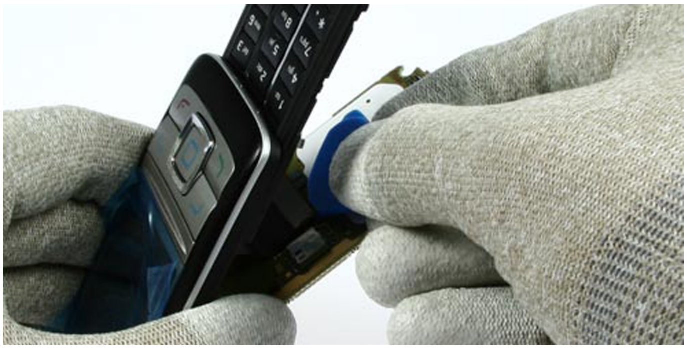
8. Mind the correct position for assembly.



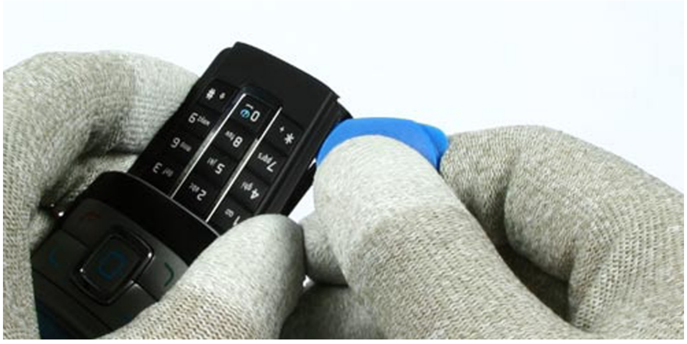
9. Lift up the **Engine module**, but remember that the flex connector is still connected.



10. Open the flex connector carefully

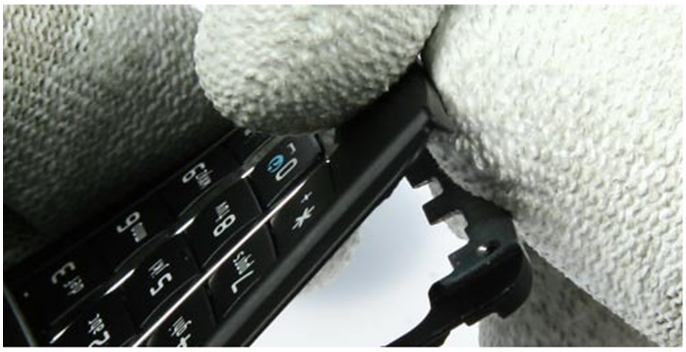


11. Lever out the glued **Keymat assy**.

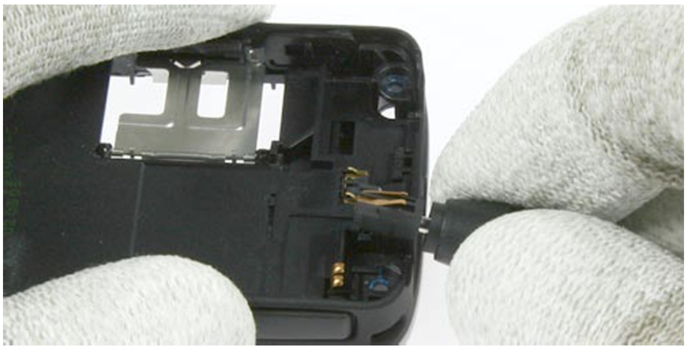


12. Ensure that no residue of adhesive remains.

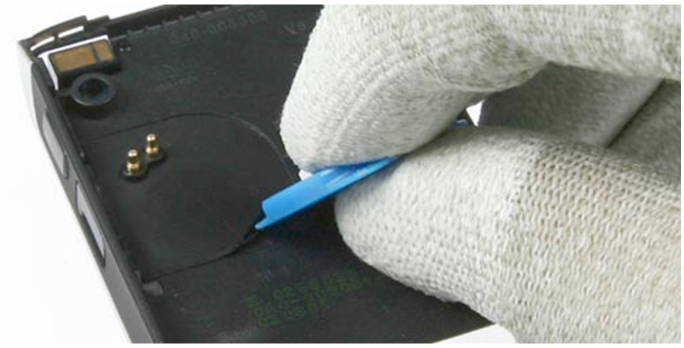
Note: Always use new adhesive for assembly.



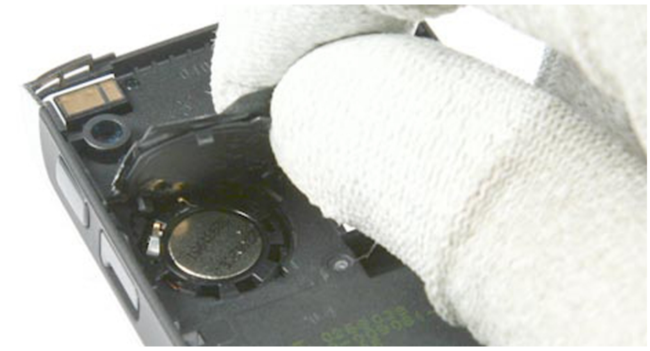
13. Remove the **DC jack** with the DC plug.



14. Release the **IHF label** with the SRT-6.



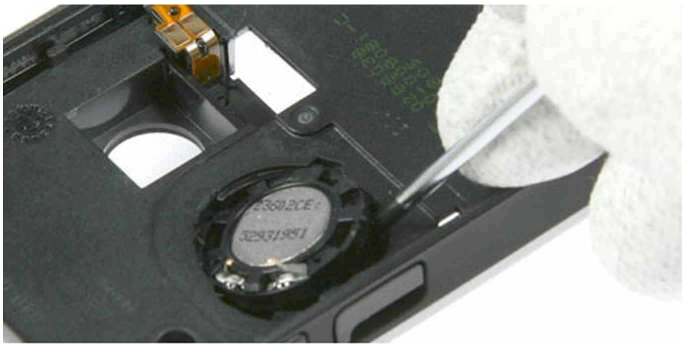
15. Remove the **IHF lid**.



16. Peel up the **IHF label** completely. Make sure that no residue remains.

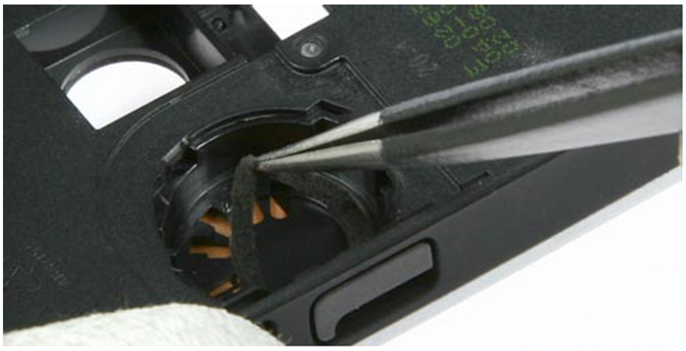
    Note: Always use a new IHF label for reassembly.

17. Lever out the **IHF speaker**.



18. Always remove the residues of the **IHF gasket**.

    Note: Use a new IHF gasket for reassembly.



19. Ease out the **microphone** with a dental tool. Once removed, the microphone cannot be used again.

Reassembly instructions (Lower part)

Steps

1. For reassembly, follow the Disassembly instructions, but *in reversed order*

    Note: Pay special attention to steps 18, 16, 12, 8, 4 and 3.

    Note: For reassembly, ALWAYS USE NEW SCREWS.

(This page left intentionally blank.)

6 — BB Troubleshooting and Manual Tuning Guide

(This page left intentionally blank.)

Table of Contents

General troubleshooting....6–5
Dead or jammed device troubleshooting....6–6
General power checking....6–8
Golden eye troubleshooting....6–9
Charging troubleshooting....6–10
Flash programming fault troubleshooting....6–11
SD card troubleshooting....6–14
CMT SDRAM memory troubleshooting....6–15
CMT NOR flash fault troubleshooting....6–16
Power key troubleshooting....6–17
USB interface troubleshooting....6–18
SIM card troubleshooting....6–20
Main keyboard troubleshooting....6–21
Top keyboard troubleshooting....6–22
Slide switch....6–23
Certificate restoring for BB5.0 products....6–24
Display module troubleshooting....6–30
    General instructions for display troubleshooting....6–30
    Display fault troubleshooting....6–32
    Display and top keyboard backlight troubleshooting....6–33
    Main keyboard backlight troubleshooting....6–33
Audio troubleshooting....6–34
    Audio troubleshooting test instructions....6–34
    Internal earpiece troubleshooting....6–38
    Internal microphone troubleshooting....6–39
    IHF troubleshooting....6–40
    External microphone troubleshooting....6–41
    External earpiece troubleshooting....6–42
    Vibra troubleshooting....6–43
Baseband manual tuning guide....6–43
    Energy management calibration....6–43

List of Tables

Table 10 Display module troubleshooting cases....6–30
Table 11 Pixel defects....6–30
Table 12 Calibration value limits....6–44

List of Figures

Figure 40 Main troubleshooting tree....6–5
Figure 41 Flashing pic 1. Take single trig measurement for the rise of the BSI signal....6–12
Figure 42 Flashing pic 2. Take single trig measurement for the rise of the BSI signal....6–13
Figure 43 SD card initialization from pin J3206....6–15
Figure 44 CMT NOR flash troubleshooting....6–16
Figure 45 NOR CLK from J3004....6–16
Figure 46 USB 1: D-TXD (PopPort TM pin 6) and D+RXD (PopPort TM pin 7) voltage levels when USB is connected.....6–19
Figure 47 SIM interface signals....6–20
Figure 48 Slide switch and test point....6–24

Figure 49 Single-ended output waveform of the Ext_in_HP_out measurement when earpiece is connected. 6–36
Figure 50 Differential output waveform of the Ext_in_IHF_out out loop measurement when speaker is connected..6–37
Figure 51 Single-ended output waveform of the HP_in_Ext_out loop when microphone is connected..... 6–37

General troubleshooting

For practical reasons troubleshooting is divided in three different chapters:

- Baseband troubleshooting
- Camera troubleshooting
- RF troubleshooting including FM Radio and Bluetouth

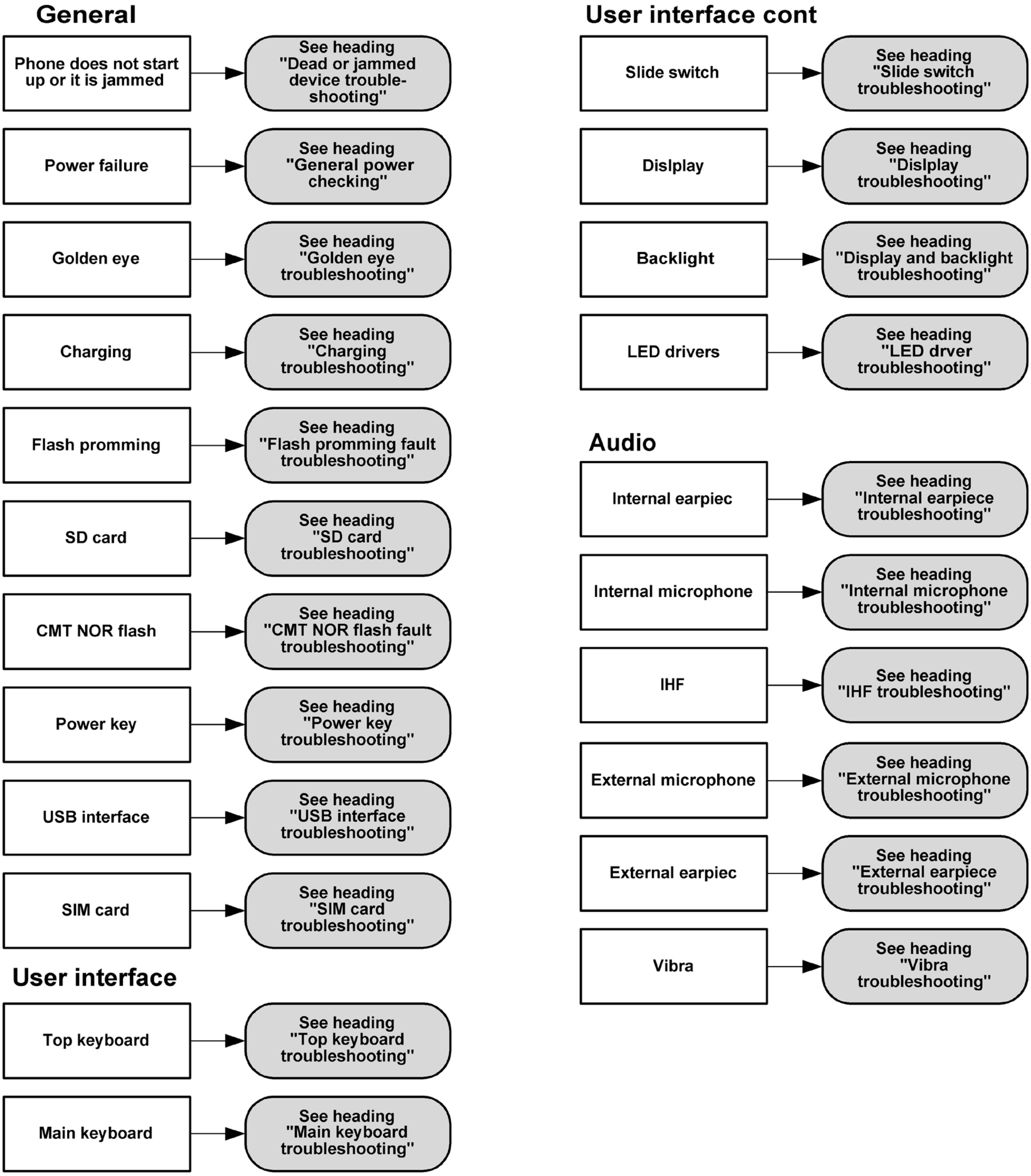
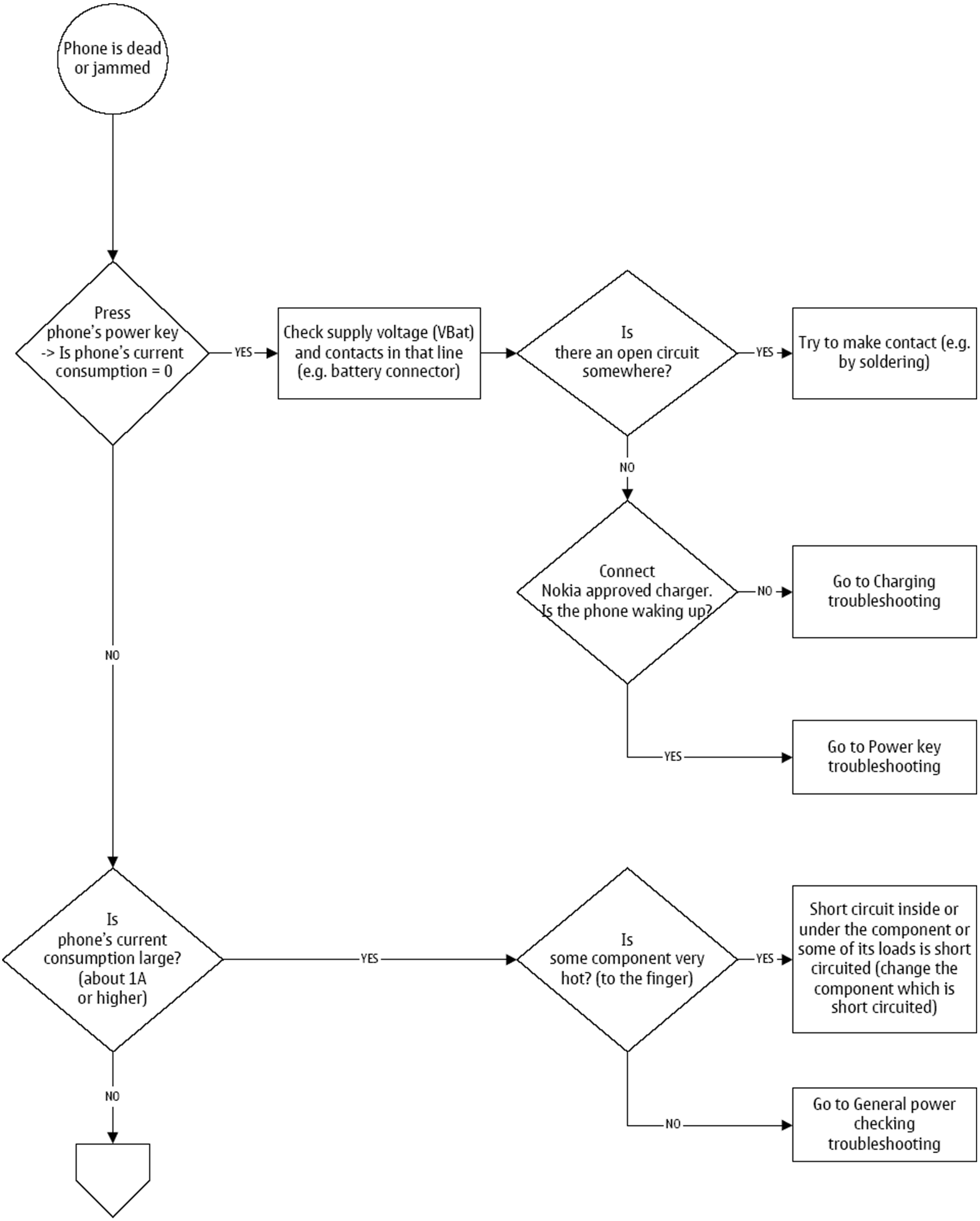
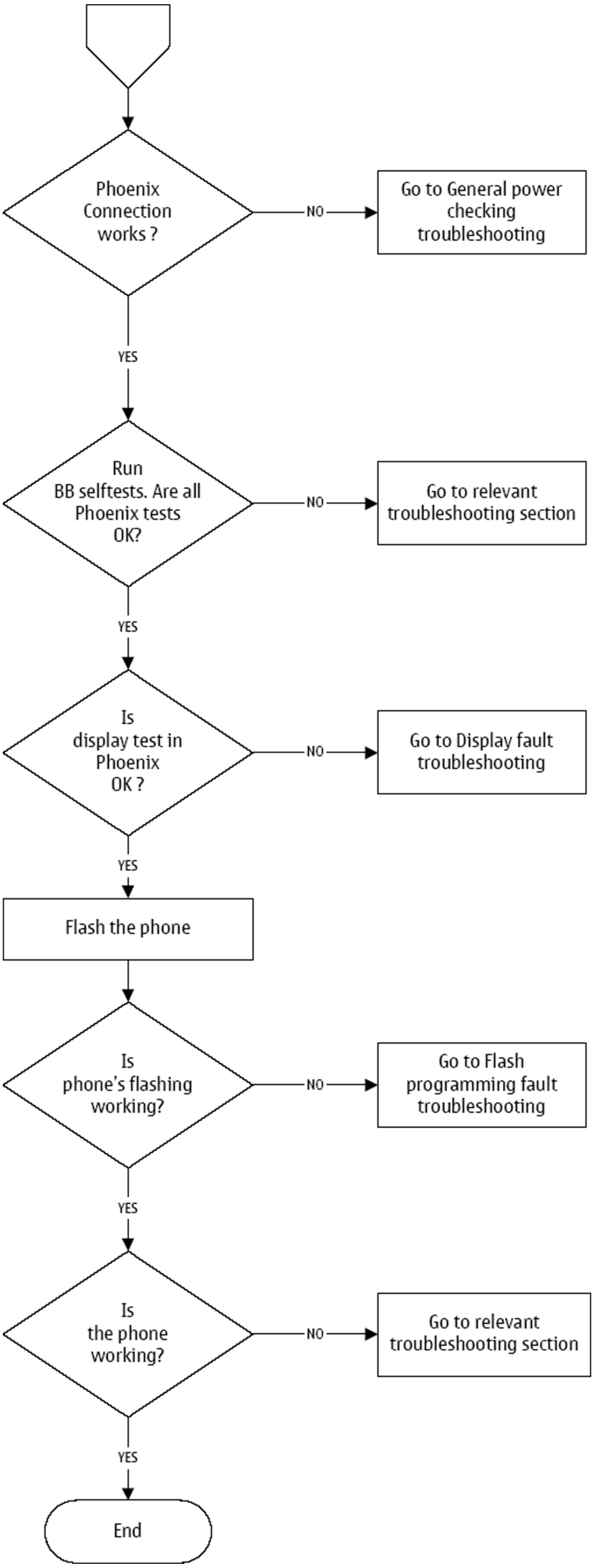

General
Phone does not start up or it is jammed
See heading "Dead or jammed device trouble-shooting"
Power failure
See heading "General power checking"
Golden eye
See heading "Golden eye troubleshooting"
Charging
See heading "Charging troubleshooting"
Flash promming
See heading "Flash promming fault troubleshooting"
SD card
See heading "SD card troubleshooting"
CMT NOR flash
See heading "CMT NOR flash fault troubleshooting"
Power key
See heading "Power key troubleshooting"
USB interface
See heading "USB interface troubleshooting"
SIM card
See heading "SIM card troubleshooting"
User interface
Top keyboard
See heading "Top keyboard troubleshooting"
Main keyboard
See heading "Main keyboard troubleshooting"
User interface cont
Slide switch
See heading "Slide switch troubleshooting"
Dislplay
See heading "Dislplay troubleshooting"
Backlight
See heading "Display and backlight troubleshooting"
LED drivers
See heading "LED drver troubleshooting"
Audio
Internal earpiec
See heading "Internal earpiece troubleshooting"
Internal microphone
See heading "Internal microphone troubleshooting"
IHF
See heading "IHF troubleshooting"
External microphone
See heading "External microphone troubleshooting"
External earpiec
See heading "External earpiece troubleshooting"
Vibra
See heading "Vibra troubleshooting"

Figure 40 Main troubleshooting tree

Dead or jammed device troubleshooting

Troubleshooting flow


Phone is dead or jammed
Press phone's power key -> Is phone's current consumption = 0
YES
Check supply voltage (VBat) and contacts in that line (e.g. battery connector)
Is there an open circuit somewhere?
YES
Try to make contact (e.g. by soldering)
NO
Connect Nokia approved charger. Is the phone waking up?
NO
Go to Charging troubleshooting
YES
Go to Power key troubleshooting
NO
Is phone's current consumption large? (about 1A or higher)
YES
Is some component very hot? (to the finger)
YES
Short circuit inside or under the component or some of its loads is short circuited (change the component which is short circuited)
NO
Go to General power checking troubleshooting
NO


Phoenix Connection works ?
NO
Go to General power checking troubleshooting
YES
Run BB selftests. Are all Phoenix tests OK?
NO
Go to relevant troubleshooting section
YES
Is display test in Phoenix OK ?
NO
Go to Display fault troubleshooting
YES
Flash the phone
Is phone's flashing working?
NO
Go to Flash programming fault troubleshooting
YES
Is the phone working?
NO
Go to relevant troubleshooting section
YES
End

General power checking

Voltages

Check the following voltages:

Signal Rename	Regulator	Sleep	Idle	Nominal voltage	Main user	Notes
VIO	RETU	ON	ON	1.82	Memory, I/Os, IrDA, Display	
VBACK	RETU	ON	ON	2.5	Back-up battery	
VSIM1	RETU	ON	ON	1.8/3.0	SIM card	
VSIM2	RETU	OFF	OFF	3.0	Backlight	
VDRAM	RETU	ON	ON	1.82	SDRAM	
VAUX	RETU	OFF	OFF	2.5	IrDA	IrDA active
VANA	RETU	ON	ON	2.5	Audio, some pull-ups	
VR1	RETU	OFF	ON	2.5	Crystal oscillators	
VRFC	RETU	OFF	ON	1.8	RAP3G converters	
VRCP1	RETU			4.5	To RF parts	RF active
VRCP2	RETU			4.5	To RF parts	RF active
VREF	RETU	ON	ON	1.4	RF reference	
VCORE	TAHVO	ON	ON	1.4	RAP3G digital	
VOUT	TAHVO	OFF	OFF	2.5		Accessory connected
VCAM_2V8	LP3987ITLX-2.85/N1060	OFF	OFF	2.85	Camera	Camera ON
VCAM_1V8	LP3985IBLX-1.8/N1080	OFF	OFF	1.8	Camera	Camera ON
VCAM_1V5	TPS62311YZDR/N1050	OFF	OFF	1.5	Camera	Camera ON
2V8_FM_LCD	LP3985ITLX-2.85/N6050	ON	ON	2.85	FM, LCD, Hall sensor	Camera ON
VMMC	LP3928TLX-1828/N3200	OFF	OFF	3.0	MCC card	
KEYB_LED_OUTPUT	REG710NA-5/N2500	OFF	OFF	8	Keyboard LED's	

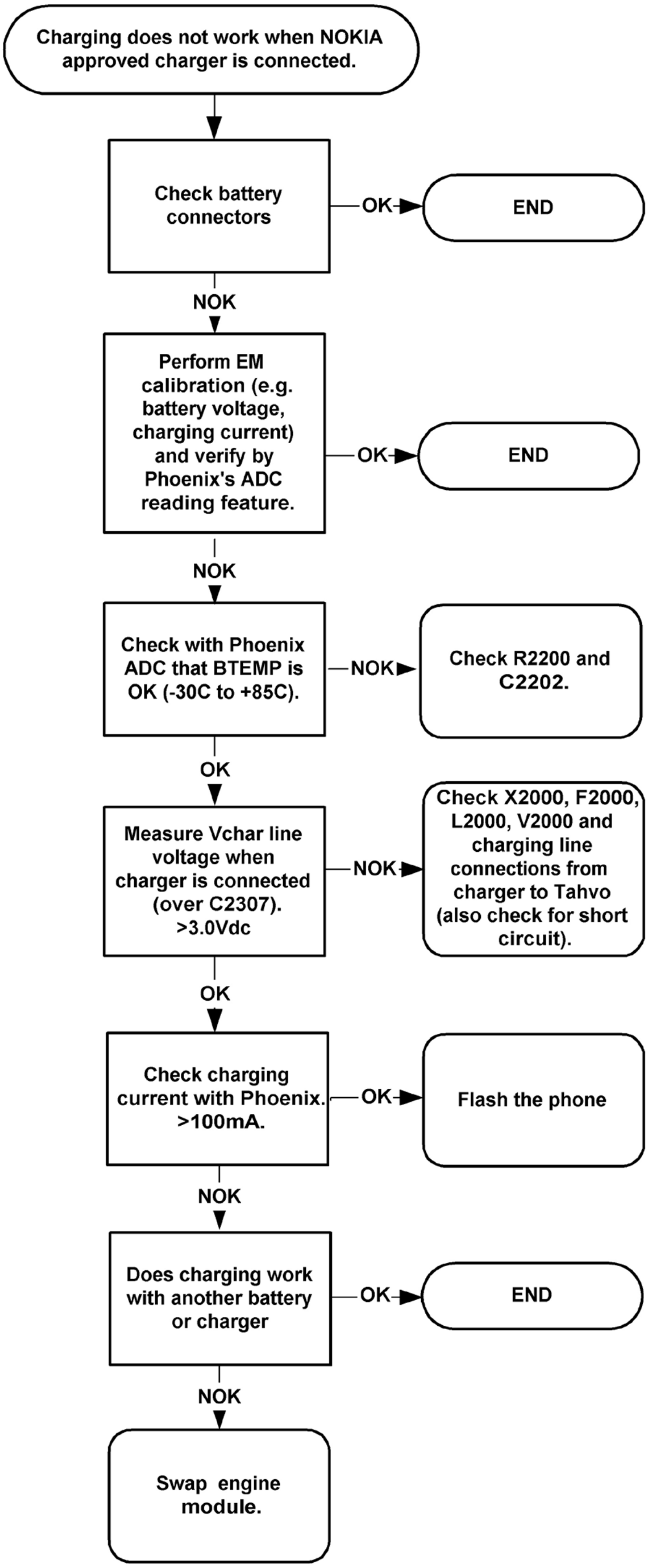
Golden eye troubleshooting

Context

Golden eye is placed on the top key board under a non removable shield. Instead of changing the golden eye, the key board has to be swapped.

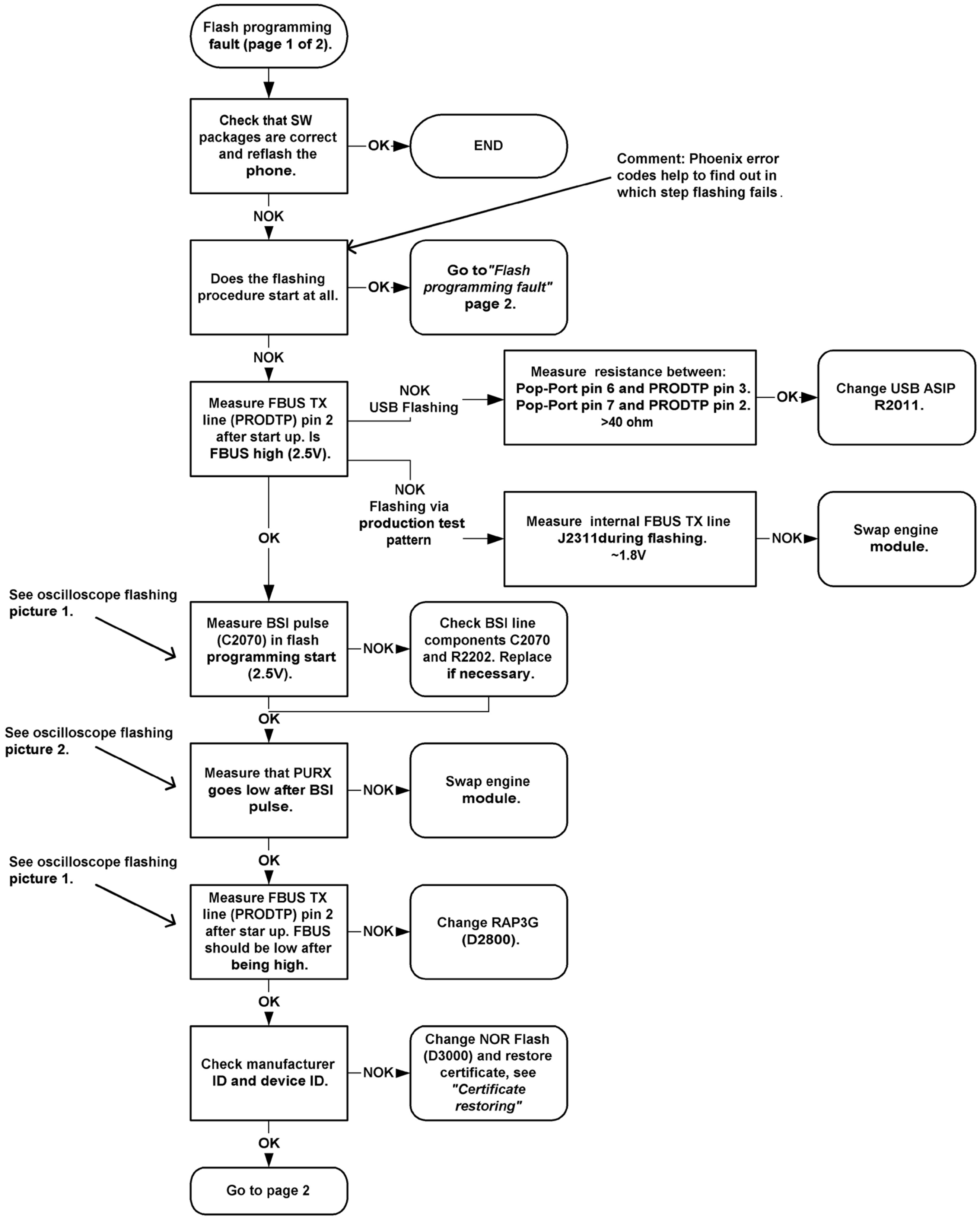
Charging troubleshooting

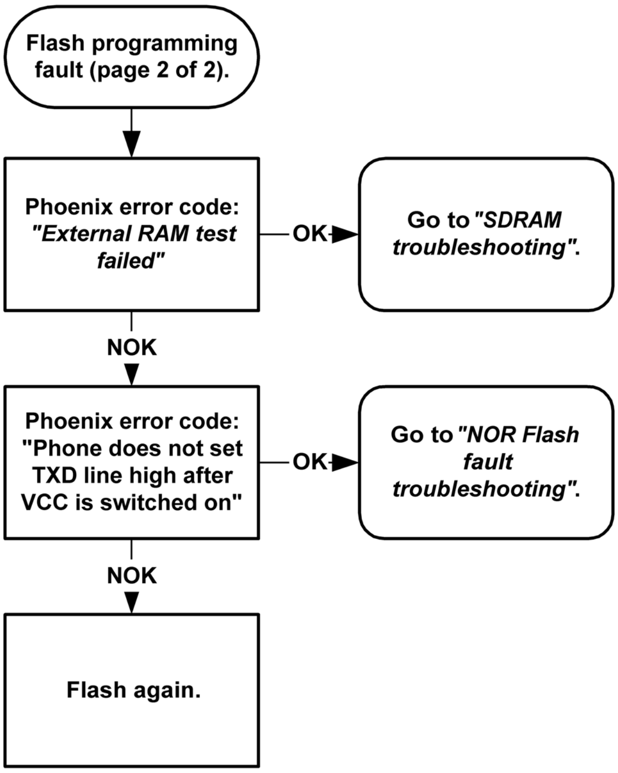
Troubleshooting flow

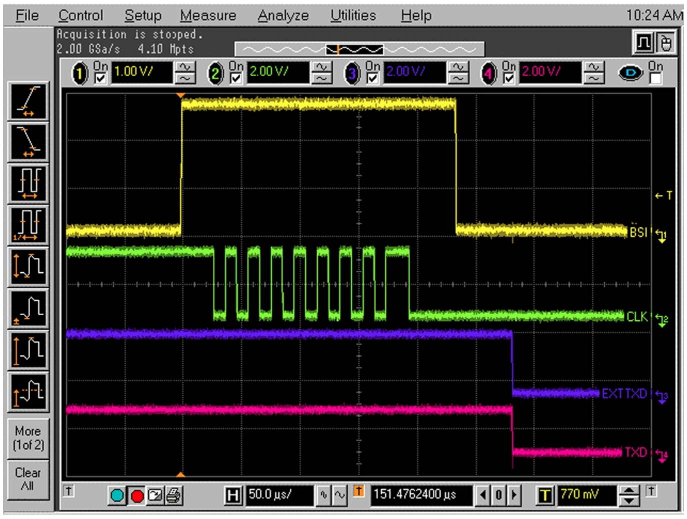

Charging does not work when NOKIA approved charger is connected.
Check battery connectors
OK
END
NOK
Perform EM calibration (e.g. battery voltage, charging current) and verify by Phoenix's ADC reading feature.
OK
END
NOK
Check with Phoenix ADC that BTEMP is OK (-30C to +85C).
NOK
Check R2200 and C2202.
OK
Measure Vchar line voltage when charger is connected (over C2307). >3.0Vdc
NOK
Check X2000, F2000, L2000, V2000 and charging line connections from charger to Tahvo (also check for short circuit).
OK
Check charging current with Phoenix. >100mA.
OK
Flash the phone
NOK
Does charging work with another battery or charger
OK
END
NOK
Swap engine module.

Flash programming fault troubleshooting

Troubleshooting flow


Flash programming fault (page 1 of 2).
Check that SW packages are correct and reflash the phone.
OK
END
Comment: Phoenix error codes help to find out in which step flashing fails.
NOK
Does the flashing procedure start at all.
OK
Go to "Flash programming fault" page 2.
NOK
Measure FBUS TX line (PRODTP) pin 2 after start up. Is FBUS high (2.5V).
NOK USB Flashing
Measure resistance between: Pop-Port pin 6 and PRODTP pin 3. Pop-Port pin 7 and PRODTP pin 2. >40 ohm
OK
Change USB ASIP R2011.
NOK Flashing via production test pattern
Measure internal FBUS TX line J2311during flashing. ~1.8V
NOK
Swap engine module.
OK
See oscilloscope flashing picture 1.
Measure BSI pulse (C2070) in flash programming start (2.5V).
NOK
Check BSI line components C2070 and R2202. Replace if necessary.
OK
See oscilloscope flashing picture 2.
Measure that PURX goes low after BSI pulse.
NOK
Swap engine module.
OK
See oscilloscope flashing picture 1.
Measure FBUS TX line (PRODTP) pin 2 after star up. FBUS should be low after being high.
NOK
Change RAP3G (D2800).
OK
Check manufacturer ID and device ID.
NOK
Change NOR Flash (D3000) and restore certificate, see "Certificate restoring"
OK
Go to page 2


Flash programming fault (page 2 of 2).
Phoenix error code: *"External RAM test failed"*
OK
Go to *"SDRAM troubleshooting"*.
NOK
Phoenix error code: "Phone does not set TXD line high after VCC is switched on"
OK
Go to *"NOR Flash fault troubleshooting"*.
NOK
Flash again.


File
Control
Setup
Measure
Analyze
Utilities
Help
10:24 AM
1.00 V/
2.00 V/
2.00 V/
2.00 V/
On
BSI
CLK
EXT TXD
TXD
T
More (1of 2)
Clear All
H
50.0 µs/
151.4762400 µs
0
770 mV

Acquisition is stopped.
2.00 GSa/s 4.10 Mpts

Figure 41 Flashing pic 1. Take single trig measurement for the rise of the BSI signal.

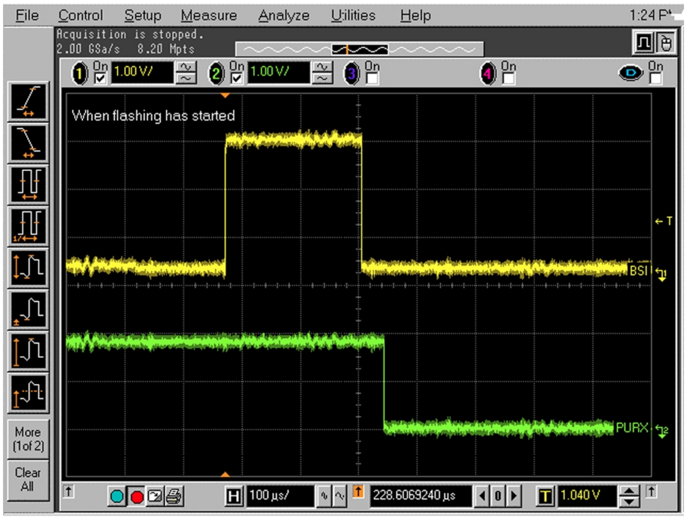
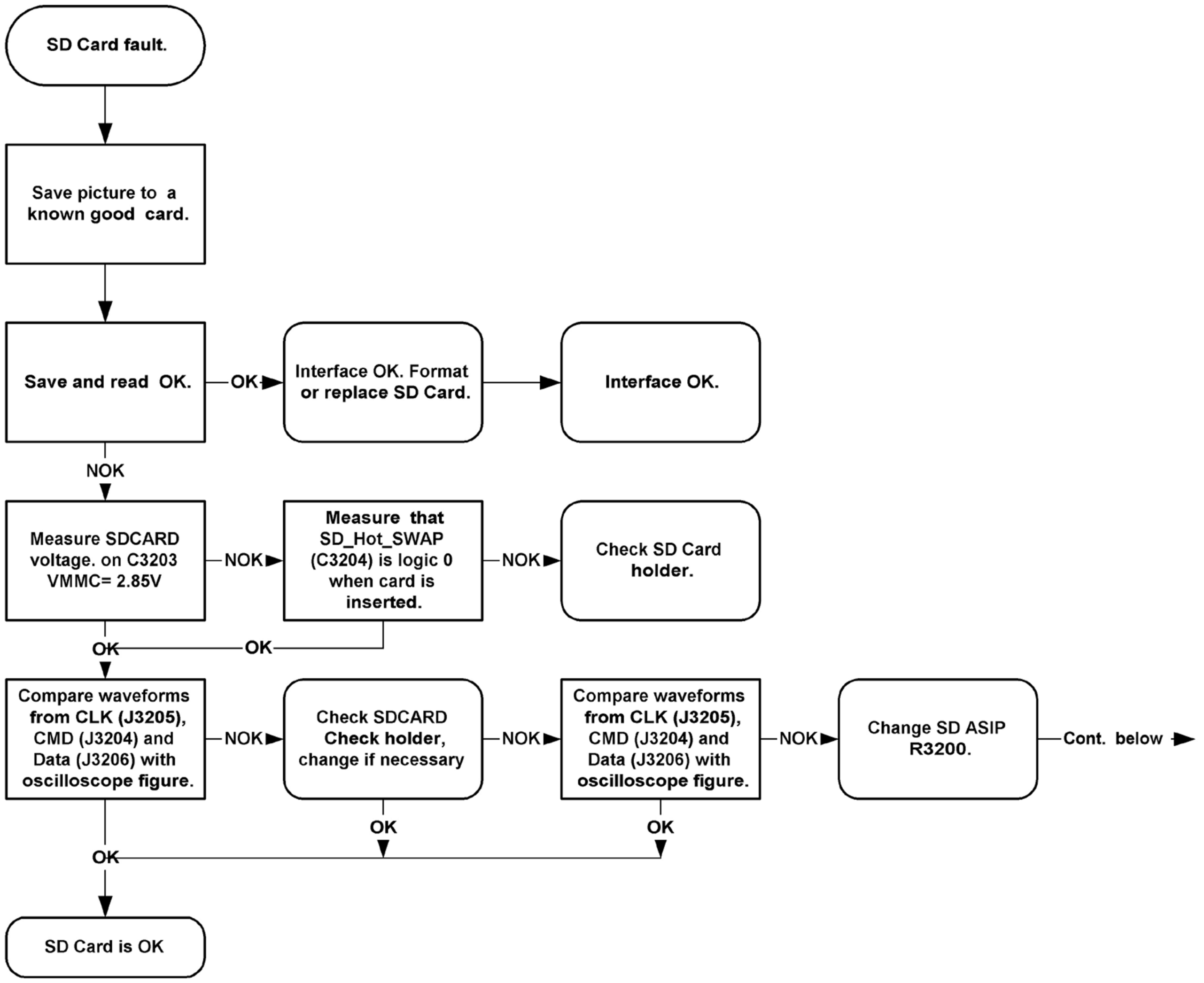
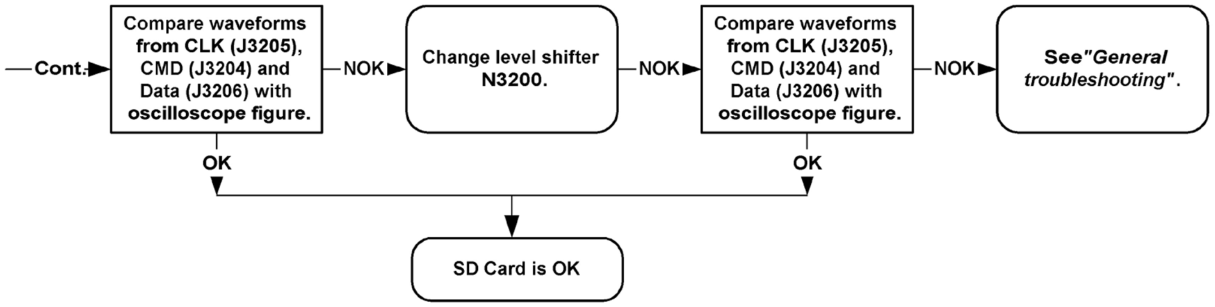

File
Control
Setup
Measure
Analyze
Utilities
Help
1:24 P
Acquisition is stopped.
2.00 GSa/s 8.20 Mpts
On
1.00 V/
On
1.00 V/
On
On
On
When flashing has started
T
BSI
PURX
More (1of 2)
Clear All
100 µs/
228.6069240 µs
1.040 V

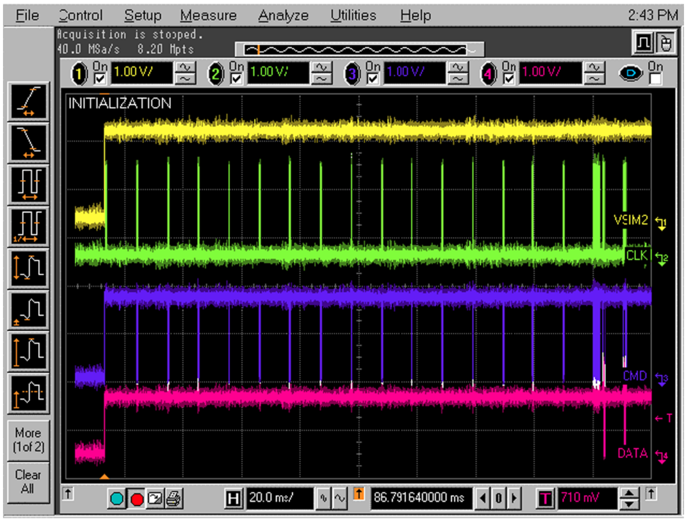
Figure 42 Flashing pic 2. Take single trig measurement for the rise of the BSI signal.

SD card troubleshooting

Troubleshooting flow


SD Card fault.
Save picture to a known good card.
Save and read OK.
OK
Interface OK. Format or replace SD Card.
Interface OK.
NOK
Measure SDCARD voltage. on C3203 VMMC= 2.85V
NOK
Measure that SD_Hot_SWAP (C3204) is logic 0 when card is inserted.
NOK
Check SD Card holder.
OK
OK
Compare waveforms from CLK (J3205), CMD (J3204) and Data (J3206) with oscilloscope figure.
NOK
Check SDCARD Check holder, change if necessary
NOK
Compare waveforms from CLK (J3205), CMD (J3204) and Data (J3206) with oscilloscope figure.
NOK
Change SD ASIP R3200.
Cont. below
OK
OK
OK
SD Card is OK


Cont.
Compare waveforms from CLK (J3205), CMD (J3204) and Data (J3206) with oscilloscope figure.
NOK
Change level shifter N3200.
NOK
Compare waveforms from CLK (J3205), CMD (J3204) and Data (J3206) with oscilloscope figure.
NOK
See "General troubleshooting".
OK
OK
SD Card is OK


File
Control
Setup
Measure
Analyze
Utilities
Help
2:43 PM
Acquisition is stopped.
40.0 MSa/s 8.20 Mpts
1.00 V/
1.00 V/
1.00 V/
1.00 V/
INITIALIZATION
VSIM2
CLK
CMD
DATA
More (1 of 2)
Clear All
20.0 ms/
86.791640000 ms
710 mV

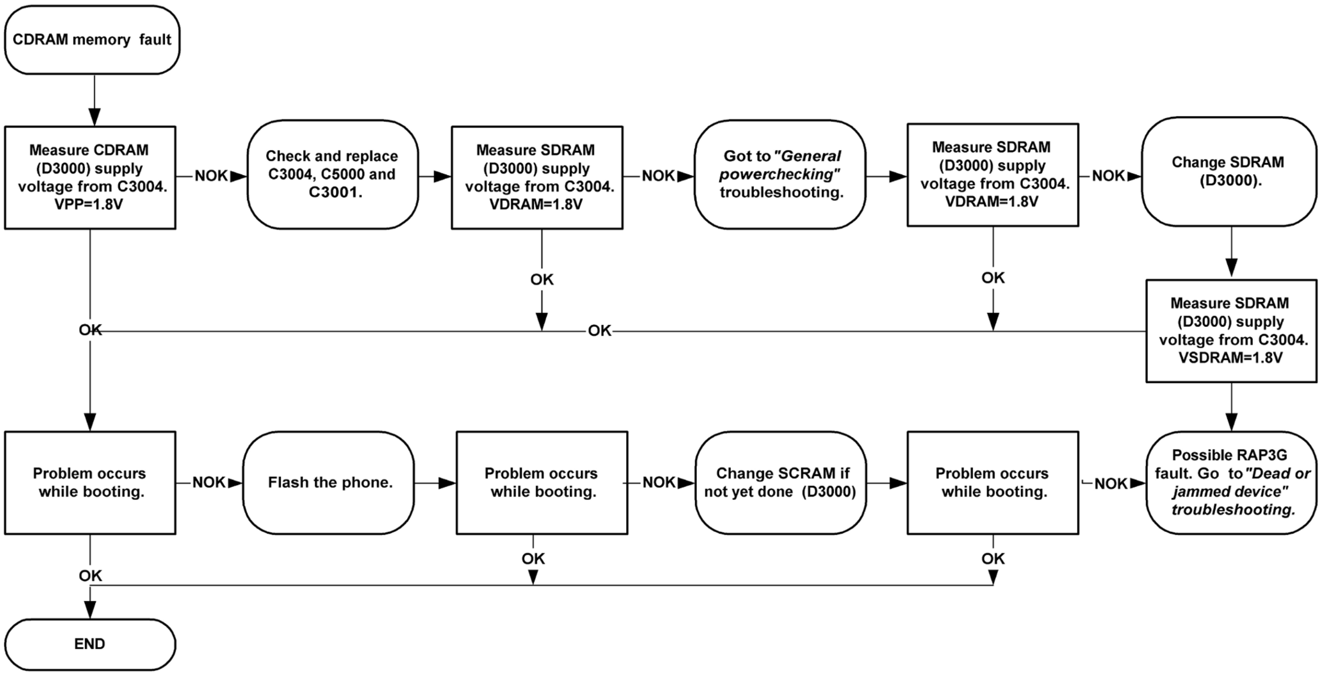
Legend

Take singe trig measurement on the rising edge of the DAT signal.

Figure 43 SD card initialization from pin J3206

CMT SDRAM memory troubleshooting

Troubleshooting flow


CDRAM memory fault
Measure CDRAM (D3000) supply voltage from C3004. VPP=1.8V
NOK
Check and replace C3004, C5000 and C3001.
Measure SDRAM (D3000) supply voltage from C3004. VDRAM=1.8V
NOK
Got to "General powerchecking" troubleshooting.
Measure SDRAM (D3000) supply voltage from C3004. VDRAM=1.8V
NOK
Change SDRAM (D3000).
OK
OK
OK
OK
Measure SDRAM (D3000) supply voltage from C3004. VSDRAM=1.8V
Problem occurs while booting.
NOK
Flash the phone.
Problem occurs while booting.
NOK
Change SCRAM if not yet done (D3000)
Problem occurs while booting.
NOK
Possible RAP3G fault. Go to "Dead or jammed device" troubleshooting.
OK
OK
OK
END

CMT NOR flash fault troubleshooting

Troubleshooting flow

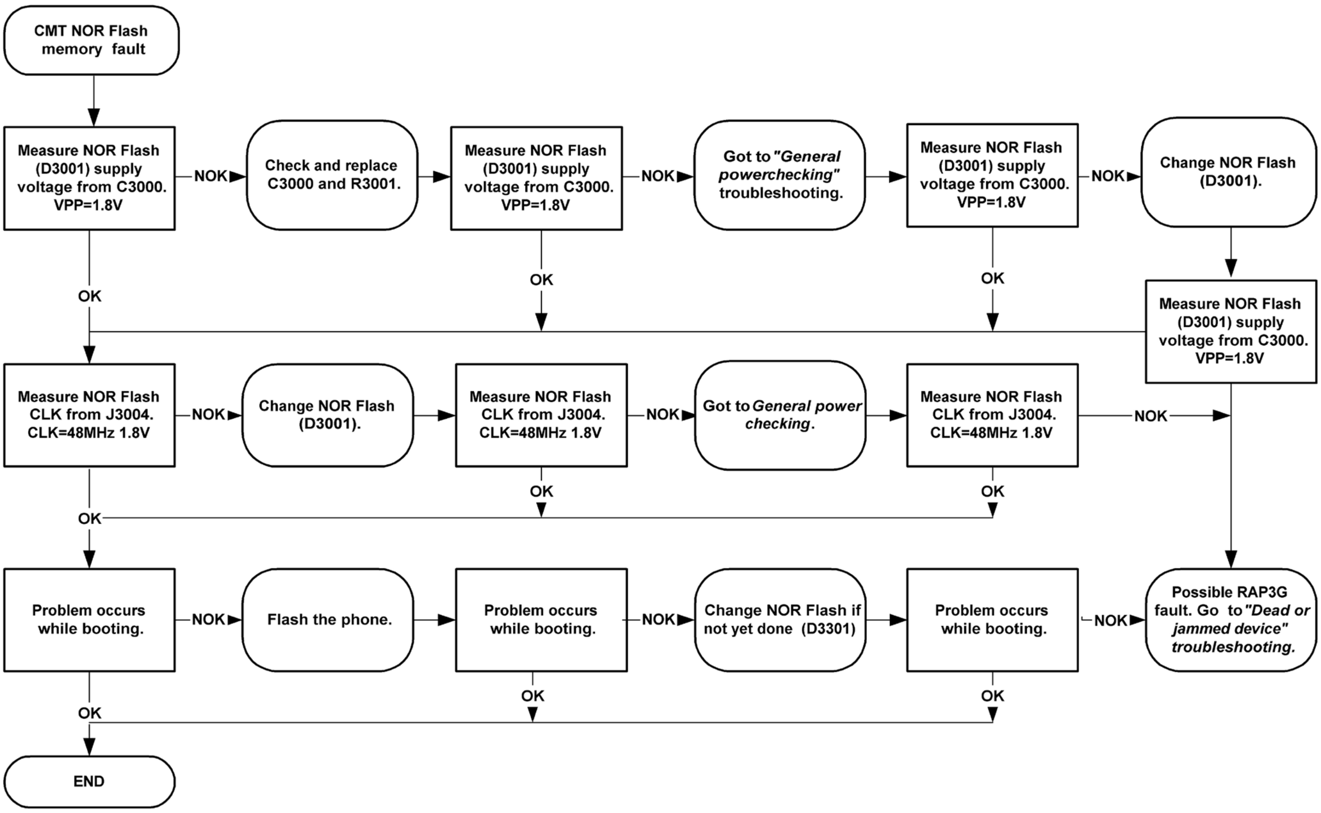
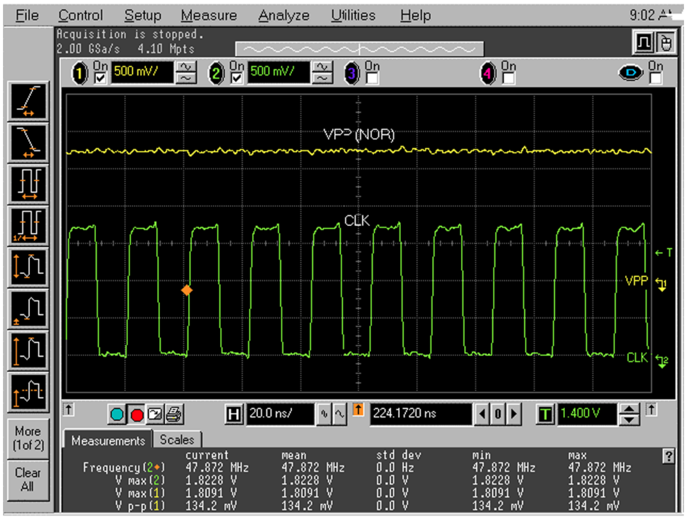

CMT NOR Flash memory fault
Measure NOR Flash (D3001) supply voltage from C3000. VPP=1.8V
NOK
Check and replace C3000 and R3001.
Measure NOR Flash (D3001) supply voltage from C3000. VPP=1.8V
NOK
Got to "General powerchecking" troubleshooting.
Measure NOR Flash (D3001) supply voltage from C3000. VPP=1.8V
NOK
Change NOR Flash (D3001).
Measure NOR Flash (D3001) supply voltage from C3000. VPP=1.8V
OK
OK
OK
Measure NOR Flash CLK from J3004. CLK=48MHz 1.8V
NOK
Change NOR Flash (D3001).
Measure NOR Flash CLK from J3004. CLK=48MHz 1.8V
NOK
Got to General power checking.
Measure NOR Flash CLK from J3004. CLK=48MHz 1.8V
NOK
OK
OK
OK
Problem occurs while booting.
NOK
Flash the phone.
Problem occurs while booting.
NOK
Change NOR Flash if not yet done (D3301)
Problem occurs while booting.
NOK
Possible RAP3G fault. Go to "Dead or jammed device" troubleshooting.
OK
OK
OK
END

Figure 44 CMT NOR flash troubleshooting

Saved: 05 JUL 2004 09:02:26


File
Control
Setup
Measure
Analyze
Utilities
Help
9:02 AM
1 On 500 mV/
2 On 500 mV/
3 On
4 On
On
VPP (NOR)
CLK
T
VPP
CLK
More (1of 2)
Clear All
20.0 ns/
224.1720 ns
0
1.400 V
Measurements
Scales

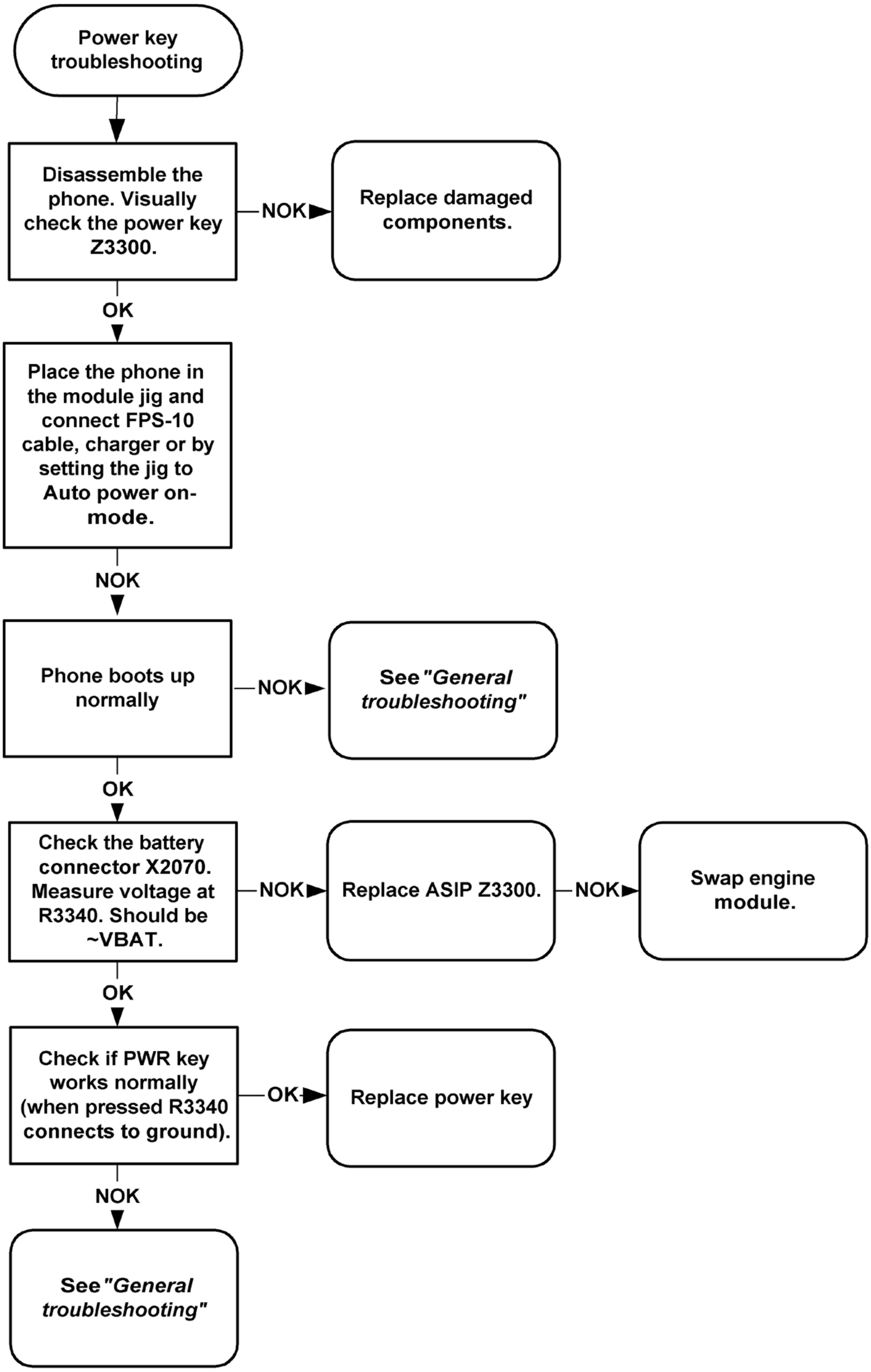
```
Acquisition is stopped.
2.00 GSa/s   4.10 Mpts
```

```
               current      mean         std dev     min          max
Frequency(2♦)  47.872 MHz   47.872 MHz   0.0 Hz      47.872 MHz   47.872 MHz
    V max(2)   1.8228 V     1.8228 V     0.0 V       1.8228 V     1.8228 V
    V max(1)   1.8091 V     1.8091 V     0.0 V       1.8091 V     1.8091 V
    V p-p(1)   134.2 mV     134.2 mV     0.0 V       134.2 mV     134.2 mV
```

Figure 45 NOR CLK from J3004

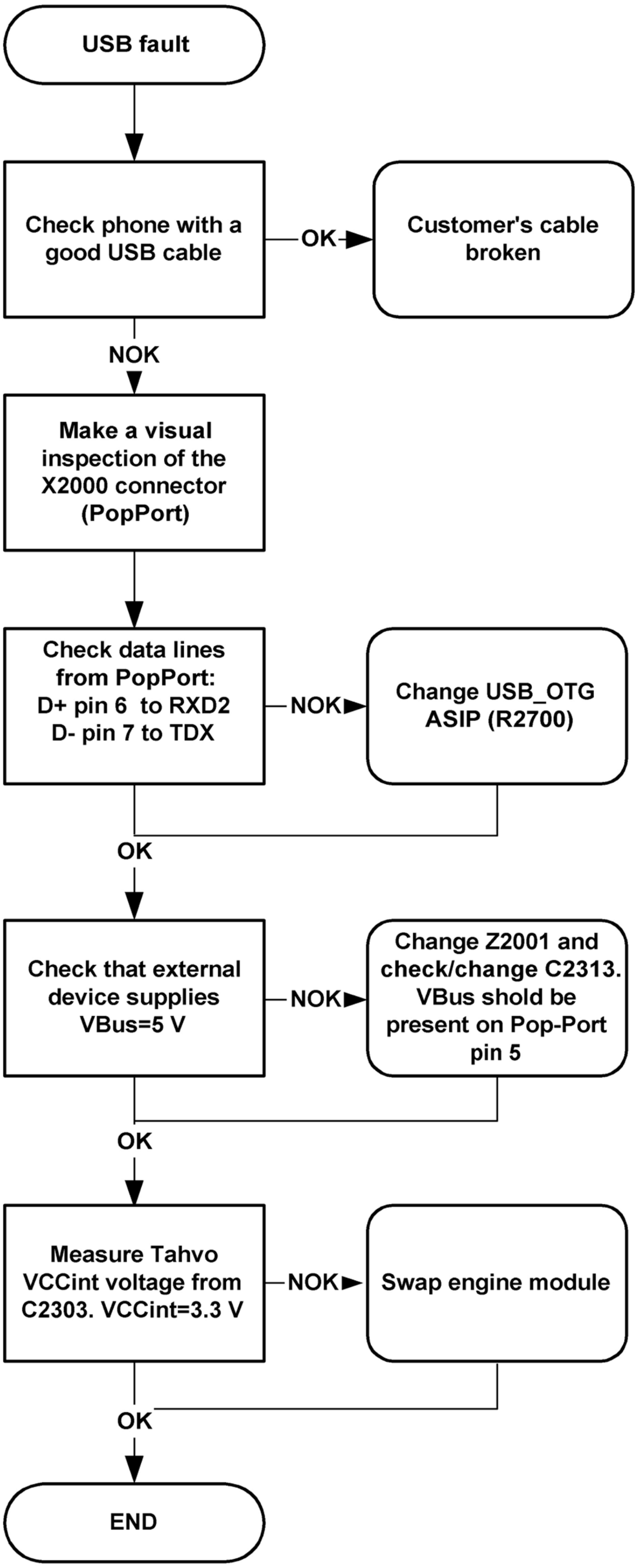
Power key troubleshooting

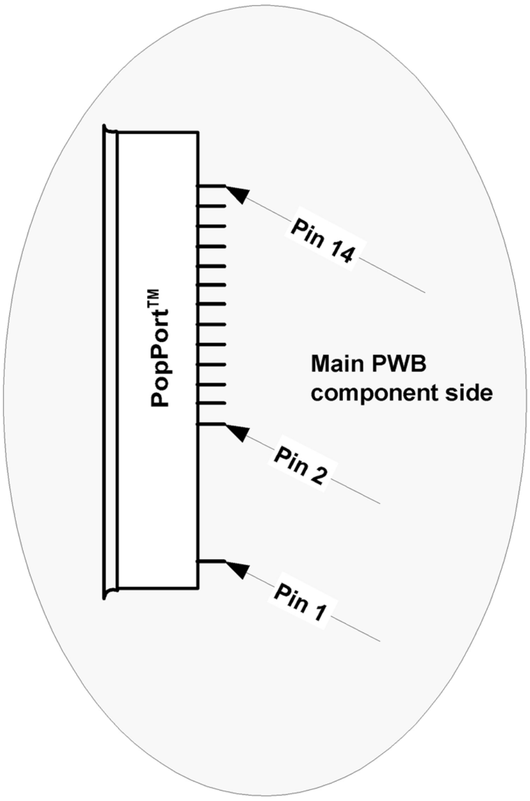
Troubleshooting flow

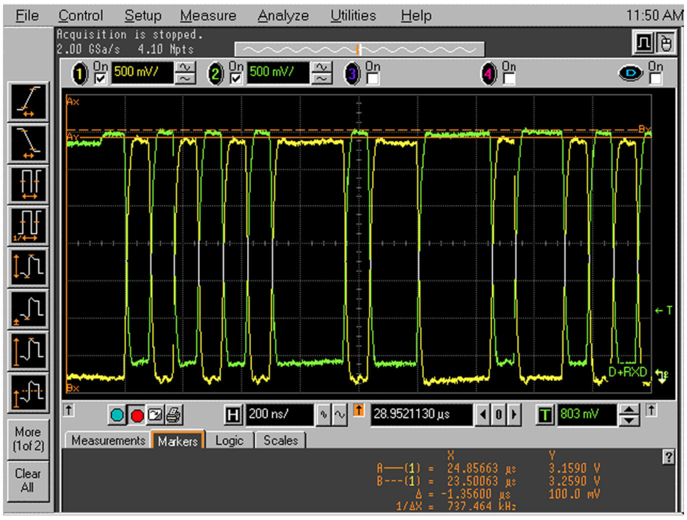

Power key troubleshooting
Disassemble the phone. Visually check the power key Z3300.
NOK
Replace damaged components.
OK
Place the phone in the module jig and connect FPS-10 cable, charger or by setting the jig to Auto power on-mode.
NOK
Phone boots up normally
NOK
See "*General troubleshooting*"
OK
Check the battery connector X2070. Measure voltage at R3340. Should be ~VBAT.
NOK
Replace ASIP Z3300.
NOK
Swap engine module.
OK
Check if PWR key works normally (when pressed R3340 connects to ground).
OK
Replace power key
NOK
See "*General troubleshooting*"

USB interface troubleshooting

Troubleshooting flow


USB fault
Check phone with a good USB cable
OK
Customer's cable broken
NOK
Make a visual inspection of the X2000 connector (PopPort)
Check data lines from PopPort: D+ pin 6 to RXD2 D- pin 7 to TDX
NOK
Change USB_OTG ASIP (R2700)
OK
Check that external device supplies VBus=5 V
NOK
Change Z2001 and check/change C2313. VBus shold be present on Pop-Port pin 5
OK
Measure Tahvo VCCint voltage from C2303. VCCint=3.3 V
NOK
Swap engine module
OK
END


PopPort™
Pin 14
Main PWB component side
Pin 2
Pin 1

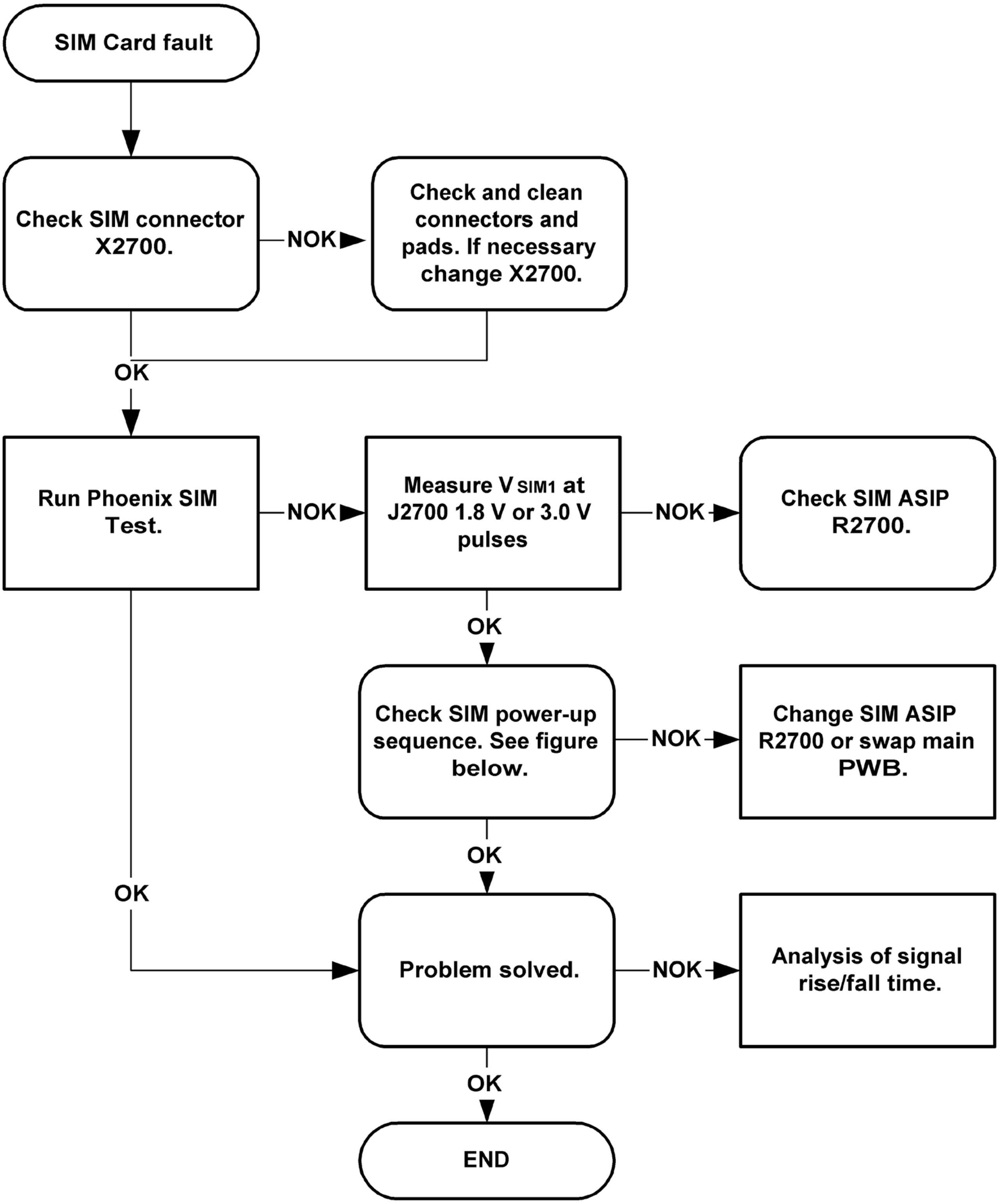

File
Control
Setup
Measure
Analyze
Utilities
Help
11:50 AM
Acquisition is stopped.
2.00 GSa/s 4.10 Mpts
On
500 mV/
On
500 mV/
On
On
On
Ax
Bx
D+RXD
More (1of 2)
Clear All
200 ns/
28.9521130 µs
0
803 mV
Measurements
Markers
Logic
Scales

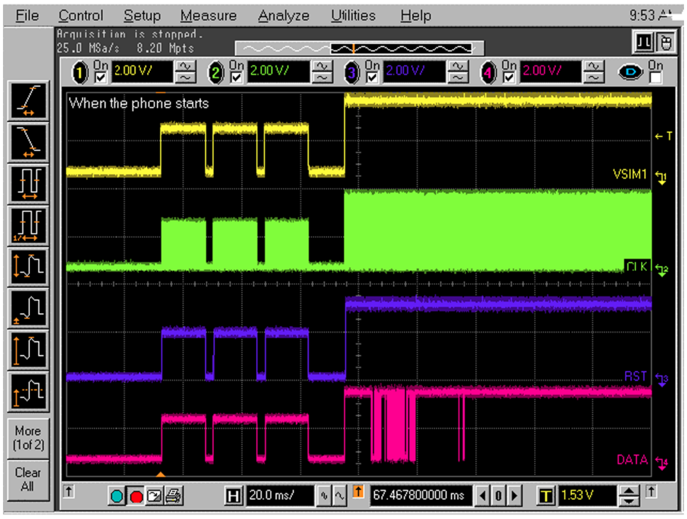
```
            X                Y
A——(1) =  24.85663 µs      3.1590 V
B---(1) =  23.50063 µs      3.2590 V
      Δ = -1.35600 µs      100.0 mV
   1/ΔX =  737.464 kHz
```

Figure 46 USB 1: D-TXD (PopPort TM™ pin 6) and D+RXD (PopPort TM™ pin 7) voltage levels when USB is connected.

SIM card troubleshooting

Troubleshooting flow


SIM Card fault
Check SIM connector X2700.
NOK
Check and clean connectors and pads. If necessary change X2700.
OK
Run Phoenix SIM Test.
NOK
Measure V SIM1 at J2700 1.8 V or 3.0 V pulses
NOK
Check SIM ASIP R2700.
OK
Check SIM power-up sequence. See figure below.
NOK
Change SIM ASIP R2700 or swap main PWB.
OK
OK
Problem solved.
NOK
Analysis of signal rise/fall time.
OK
END


File
Control
Setup
Measure
Analyze
Utilities
Help
9:53 AM
Acquisition is stopped.
25.0 MSa/s 8.20 Mpts
2.00 V/
2.00 V/
2.00 V/
2.00 V/
When the phone starts
VSIM1
CLK
RST
DATA
More (1 of 2)
Clear All
20.0 ms/
67.467800000 ms
1.53 V

Legend

SIM CLK frequency = 3.2MHz (Take single triggered measurement in boot on the VSIM1 line).

Figure 47 SIM interface signals

Main keyboard troubleshooting

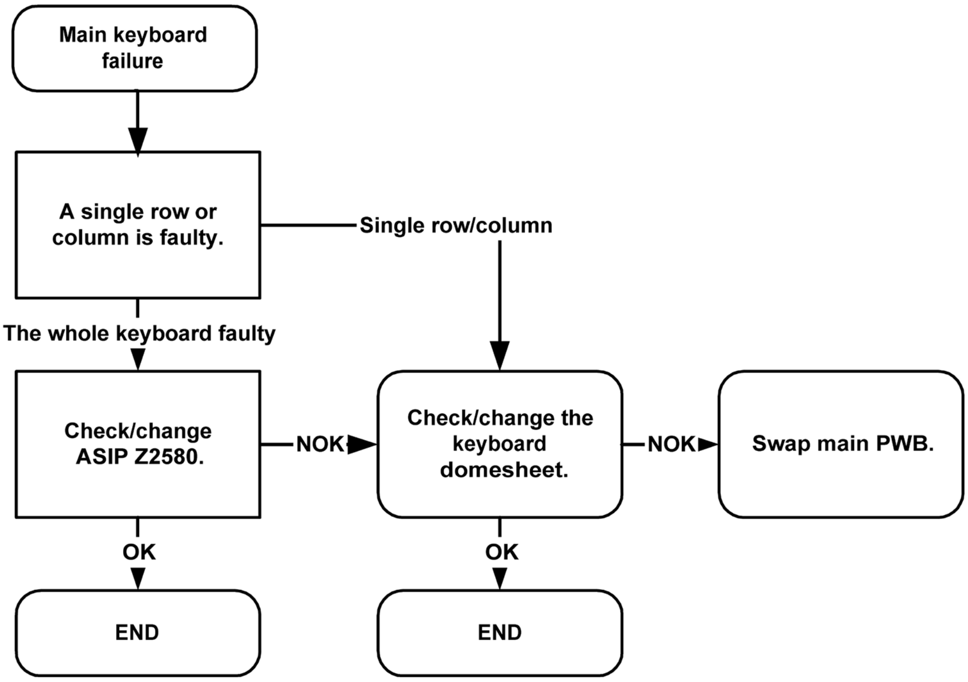
Context

There are two possible failure modes in the keyboard module:

- One or more keys can be stuck, so that the key does not react when a keydome is pressed. This kind of failure is caused by mechanical reasons (dirt, rust).
- Malfunction of several keys at the same time; this happens when one or more rows or columns are failing (shortcut or open connection).

If the failure mode is not clear, start with the Keyboard Test in Phoenix.

Troubleshooting flow


Main keyboard failure
A single row or column is faulty.
Single row/column
The whole keyboard faulty
Check/change ASIP Z2580.
NOK
Check/change the keyboard domesheet.
NOK
Swap main PWB.
OK
END
OK
END

Top keyboard troubleshooting

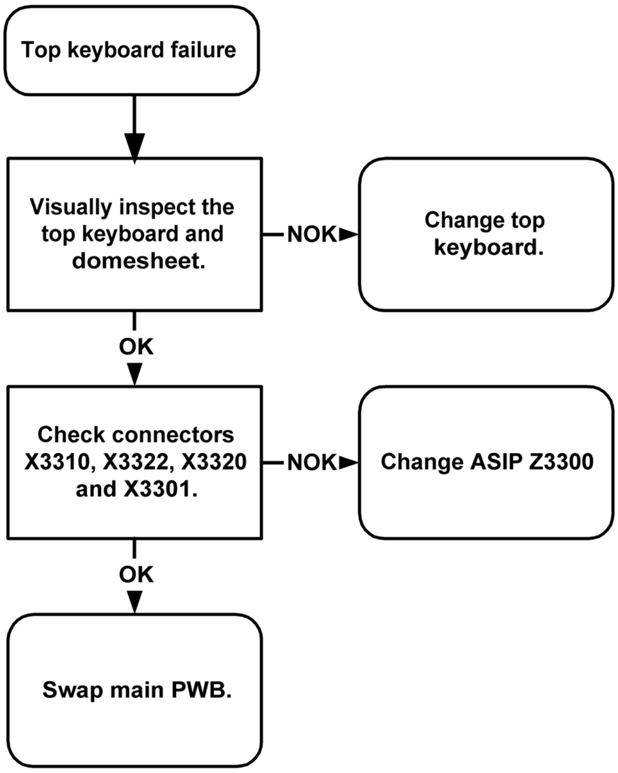
Context

There are two possible failure modes in the keyboard module:

- One or more keys can be stuck, so that the key does not react when a keydome is pressed. This kind of failure is caused by mechanical reasons (dirt, rust).
- Malfunction of several keys at the same time; this happens when one or more rows or columns are failing (shortcut or open connection).

If the failure mode is not clear, start with the Keyboard Test in Phoenix.

Troubleshooting flow


Top keyboard failure
Visually inspect the top keyboard and domesheet.
NOK
Change top keyboard.
OK
Check connectors X3310, X3322, X3320 and X3301.
NOK
Change ASIP Z3300
OK
Swap main PWB.

Slide switch

Context

The slide switch function is based on a hall detector (N2430).

Steps

1. Disassembly the phone and check the hall detector area. Also check the magnet (placed on the flex).
2. Move a magnet over the hall detector and measure on R2430. The scope will indicate a temporary change in the output (typically 1,8mV).
3. Check supply voltage 2V8_FM_LCD.

Examples

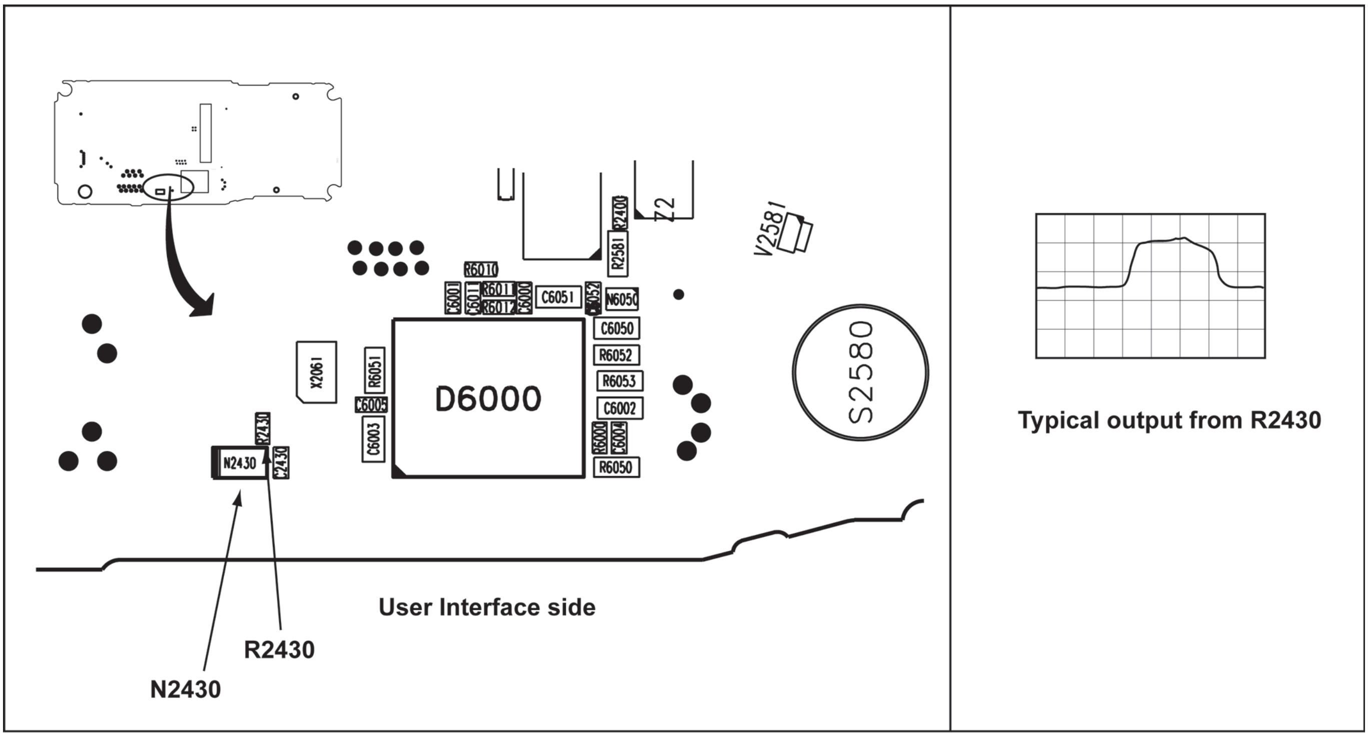

D6000
S2580
V2581
Z2
R2581
R2400
R6010
C6001
R6011
C6051
N6050
C6050
R6052
R6053
C6002
R6000
C6004
R6050
X2061
R6051
C6005
C6003
N2430
R2430
C2430
User Interface side
R2430
N2430
Typical output from R2430

Figure 48 Slide switch and test point

Certificate restoring for BB5.0 products

Context

After replacing a defective flash memory component in BB5.0 products, certificate restoring must be carried out to make the phone functional again.

Certificate restoring for BB5.0 products is basically the same process as IMEI / ESN Rebuild for DCT-4 generation products.

All tunings (RF & Baseband, UI) must be done after replacing the flash memory component, and performing the certificate restoring procedure.

The procedure for certificate restoring when a defective flash memory component has been replaced:

- Flash the phone with the latest available software using FPS-8 or FPS-10.

  Note: USB flashing does not work for a dead BB5.0 phone.

- Create a request file.
- Send the file to Nokia by e-mail.
- When you receive a reply from Nokia, carry out certificate restoring.
- Tune the phone completely.

  Note: SX-4 smart card is needed.

- If the phone resets after certificate restoring, reflash the phone again.

Required equipment and setup:

- *Phoenix* service software v 2004.39.7.70 or newer.
- The latest phone model specific *Phoenix* data package.

- PKD-1 dongle
- SX-4 smart card (Enables BB5.0 testing and tuning features)
- External smart card reader

  Note: The smart card reader is only needed when FPS-8 is used. FPS-10 has an integrated smart card reader.
- Activated FPS-8 flash prommer **OR** FPS-10 flash prommer
- Flash update package 03.18.004 or newer for FPS-8 or FPS-10 flash prommers
- CU-4 control unit
- USB cable from PC USB Port to CU-4 control unit
- Phone model specific adapter for CU-4 control unit
- PCS-1 cable to power CU-4 from external power supply
- XCS-4 modular cable between flash prommer and CU-4

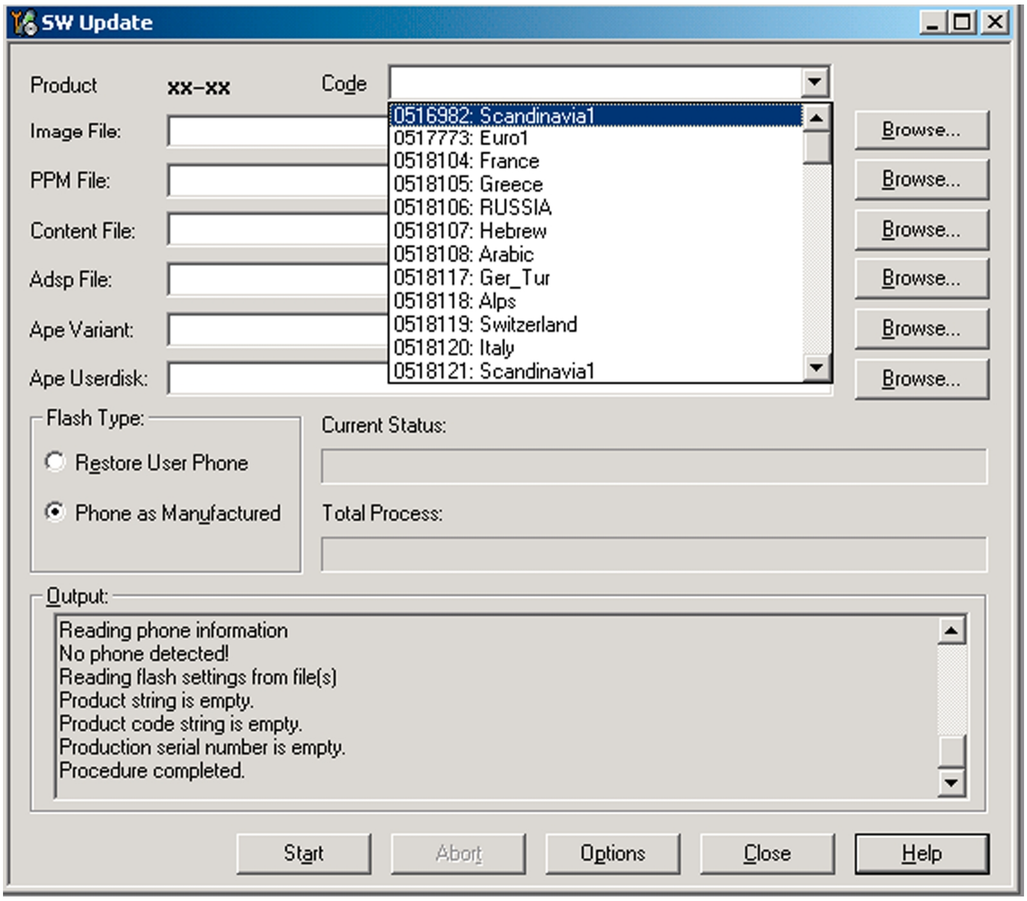
  Note: CU-4 must be supplied with +12 V from an external power supply in all steps of certificate restoring.

Steps

1. Program the phone software.
   - i Start *Phoenix* and login. Make sure the connection has been managed correctly for FPS-8 or FPS-10.
   - ii Update the phone MCU software to the latest available version.

     If the new flash is empty and the phone cannot communicate with *Phoenix*, reflash the phone.
   - iii Choose the product manually from **File→Open Product**, and click **OK**.

     Wait for the phone type designator (e.g. “RM-1”) to be displayed in the status bar.
   - iv Go to **Flashing→SW Update** and wait until *Phoenix* reads the product data as shown in the following picture.


SW Update
Image File:
PPM File:
Content File:
Adsp File:
Ape Variant:
Ape Userdisk:
Browse...
Browse...
Browse...
Browse...
Browse...
Browse...
Current Status:
Total Process:
Output:
Start
Abort
Options
Close
Help

Product xx-xx

Code

0516982: Scandinavia1
0517773: Euro1
0518104: France
0518105: Greece
0518106: RUSSIA
0518107: Hebrew
0518108: Arabic
0518117: Ger_Tur
0518118: Alps
0518119: Switzerland
0518120: Italy
0518121: Scandinavia1

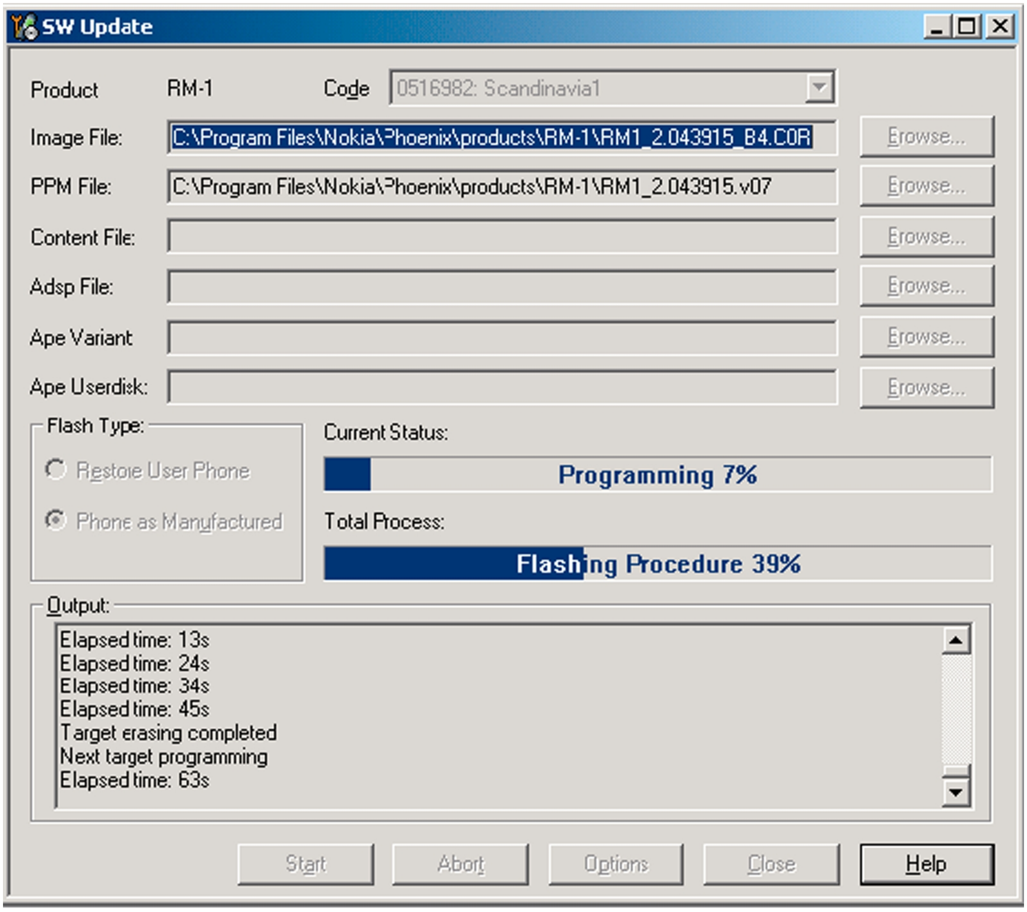
Flash Type:
○ Restore User Phone
● Phone as Manufactured

```
Reading phone information
No phone detected!
Reading flash settings from file(s)
Product string is empty.
Product code string is empty.
Production serial number is empty.
Procedure completed.
```

Product	is automatically set according to the phone support module which was opened manually, but the flash files cannot be found because the correct data cannot be read from the phone automatically.
Code	must be chosen manually, it determines the correct flash files to be used. Please choose the correct product code (can be seen in the phone type label) from the dropdown list.
Flash Type	must be set to **Phone as Manufactured**.

- To continue, click **Start**.

  Progress bars and messages on the screen show actions during phone programming, please wait.


SW Update
Browse...
Browse...
Browse...
Browse...
Browse...
Browse...
Start
Abort
Options
Close
Help

Product: RM-1
Code: 0516982: Scandinavia1
Image File: C:\Program Files\Nokia\Phoenix\products\RM-1\RM1_2.043915_B4.C0R
PPM File: C:\Program Files\Nokia\Phoenix\products\RM-1\RM1_2.043915.v07
Content File:
Adsp File:
Ape Variant:
Ape Userdisk:

Flash Type:
○ Restore User Phone
● Phone as Manufactured

Current Status: Programming 7%
Total Process: Flashing Procedure 39%

Output:

```
Elapsed time: 13s
Elapsed time: 24s
Elapsed time: 34s
Elapsed time: 45s
Target erasing completed
Next target programming
Elapsed time: 63s
```

Programming is completed when *Flashing Completed* message is displayed.

The product type designator and MCU SW version are displayed in the status bar.

vi Close the *SW Update* window and then choose **File→Close Product** .

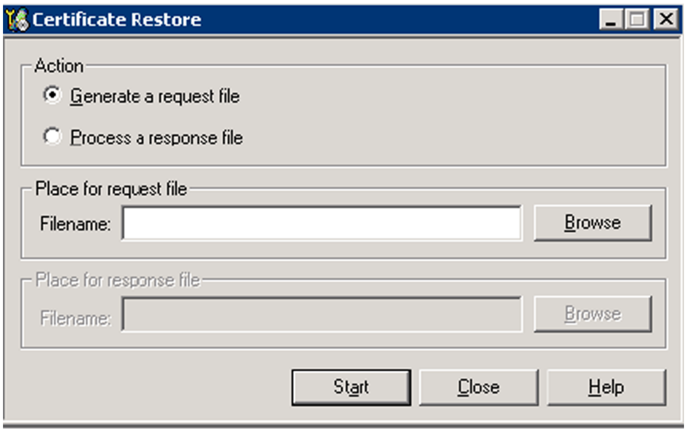
2. Create a *Request* file.

For this procedure, you must supply +12 V to CU-4 from an external power supply.

i To connect the phone with *Phoenix*, choose **File→Scan Product** .

ii Choose **Tools→Certificate Restore** .

iii To choose a location for the request file, click **Browse**.

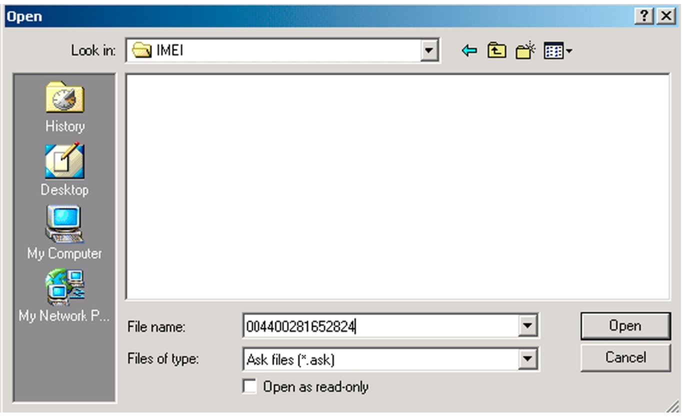

Certificate Restore
Browse
Browse
Start
Close
Help

Action
● Generate a request file
○ Process a response file

Place for request file
Filename:

Place for response file
Filename:

iv Name the file so that you can easily identify it, and click **Open**.


Open
? ×
History
Desktop
My Computer
My Network P...
Open
Cancel

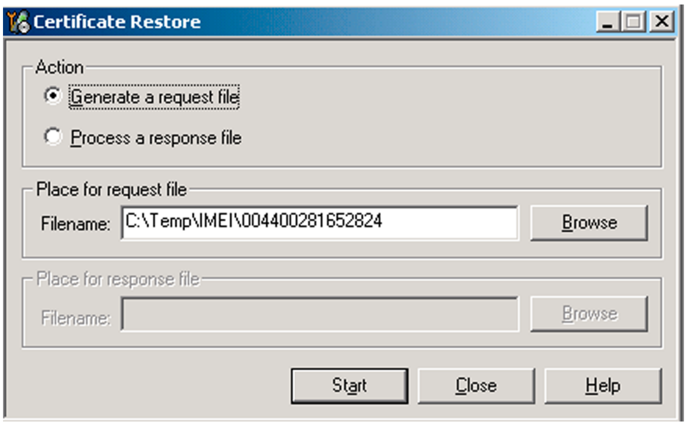
Look in: IMEI

File name: 004400281652824

Files of type: Ask files (*.ask)

☐ Open as read-only

The name of the file and its location are shown.


Certificate Restore
Browse
Browse
Start
Close
Help

Action

● Generate a request file

○ Process a response file

Place for request file

Filename: C:\Temp\IMEI\004400281652824

Place for response file

Filename:

v To create the *Request* file, click **Start**.

vi When the file for certificate restore has been created, send it to Nokia as an e-mail attachment.

3. Restore certificate.

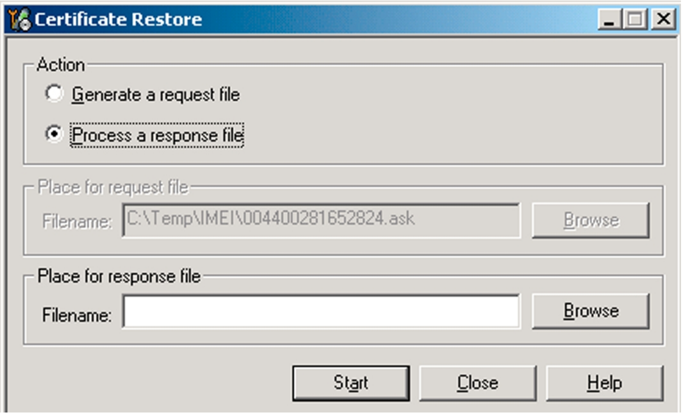
For this procedure, you must supply +12 V to CU-4 from an external power supply.

i Save the reply file sent by Nokia to your computer.

ii Start *Phoenix* service software.

iii Choose **File→Scan Product** .

iv From the **Tools** menu, choose **Certificate Restore** and select **Process a response file** in the *Action* pane.



Certificate Restore

Action

○ Generate a request file

● Process a response file

Place for request file

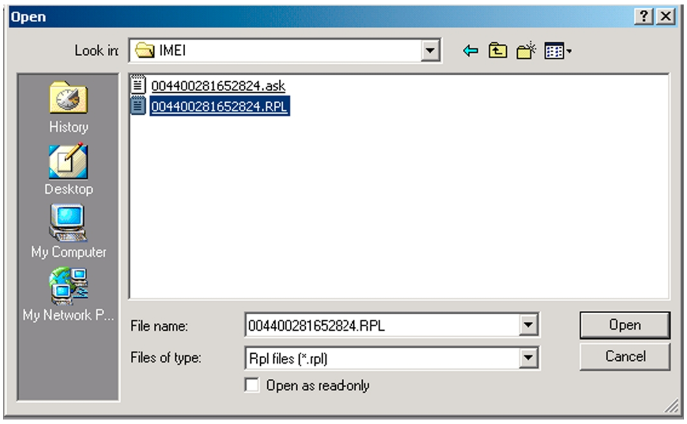
Filename: C:\Temp\IMEI\004400281652824.ask

Place for response file

Filename:

v To choose the location where response file is saved, click **Browse**.

vi Click **Open**.



Open

Look in: IMEI

004400281652824.ask

004400281652824.RPL

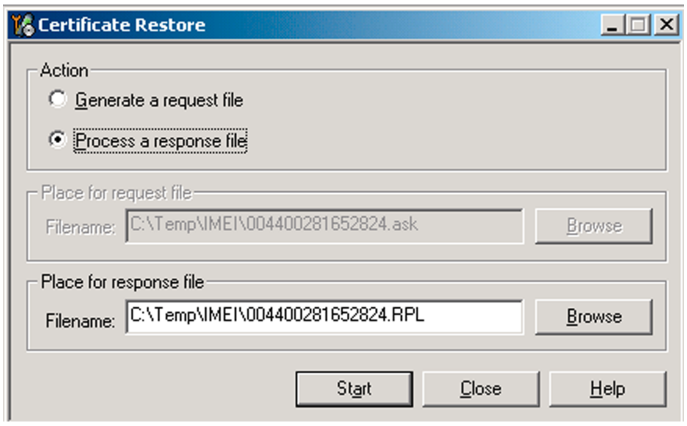
File name: 004400281652824.RPL

Files of type: Rpl files (*.rpl)

☐ Open as read-only

The name of the file and the path where it is located are shown.

vii To write the file to phone, click **Start**.



Certificate Restore

Action

○ Generate a request file

● Process a response file

Place for request file

Filename: C:\Temp\IMEI\004400281652824.ask

Place for response file

Filename: C:\Temp\IMEI\004400281652824.RPL

Next action

After a successful rewrite, you must retune the phone completely by using *Phoenix* tuning functions.

Important: Perform all tunings: RF, BB, and UI.

Display module troubleshooting

General instructions for display troubleshooting

Context

- The display is in a normal mode when the phone is in active use.
- Display is in a partial idle mode when the phone is in the screen saver mode.
- The operating modes of the display can be controlled with the help of *Phoenix*.

Table 10 Display module troubleshooting cases

Display blank	There is no image on the display. The display looks the same when the phone is on as it does when the phone is off. The backlight can be on in some cases.
Image on the display not correct	Image on the display can be corrupted or a part of the image can be missing. If a part of the image is missing, change the display module. If the image is otherwise corrupted, follow the appropriate troubleshooting diagram.
Backlight dim or not working at all	Backlight LED components are inside the display module. Backlight failure can also be in the connector or in the backlight power source in the main engine of the phone. Backlight is also controlled automatically by the ambient light sensor. This means that in case the display is working (image OK), the backlight is faulty.
Visual defects (pixel)	Pixel defects can be checked by controlling the display with Phoenix. Use both colours, black and white, on a full screen. The display may have some random pixel defects that are acceptable for this type of display. The criteria when pixel defects are regarded as a display failure, resulting in a replacement of the display, are presented the following table.

Table 11 Pixel defects

Item		White dot defect				Black dot defect	Total
1	Defect counts	R	G	B	White Dot Total	1	1
		1	1	1	1		
2	Combined defect counts	Not allowed. Two single dot defects that are within 5 mm of each other should be interpreted as combined dot defect.					

Steps

1. Verify with a working display that the fault is not on the display module itself.

   The display module cannot be repaired.

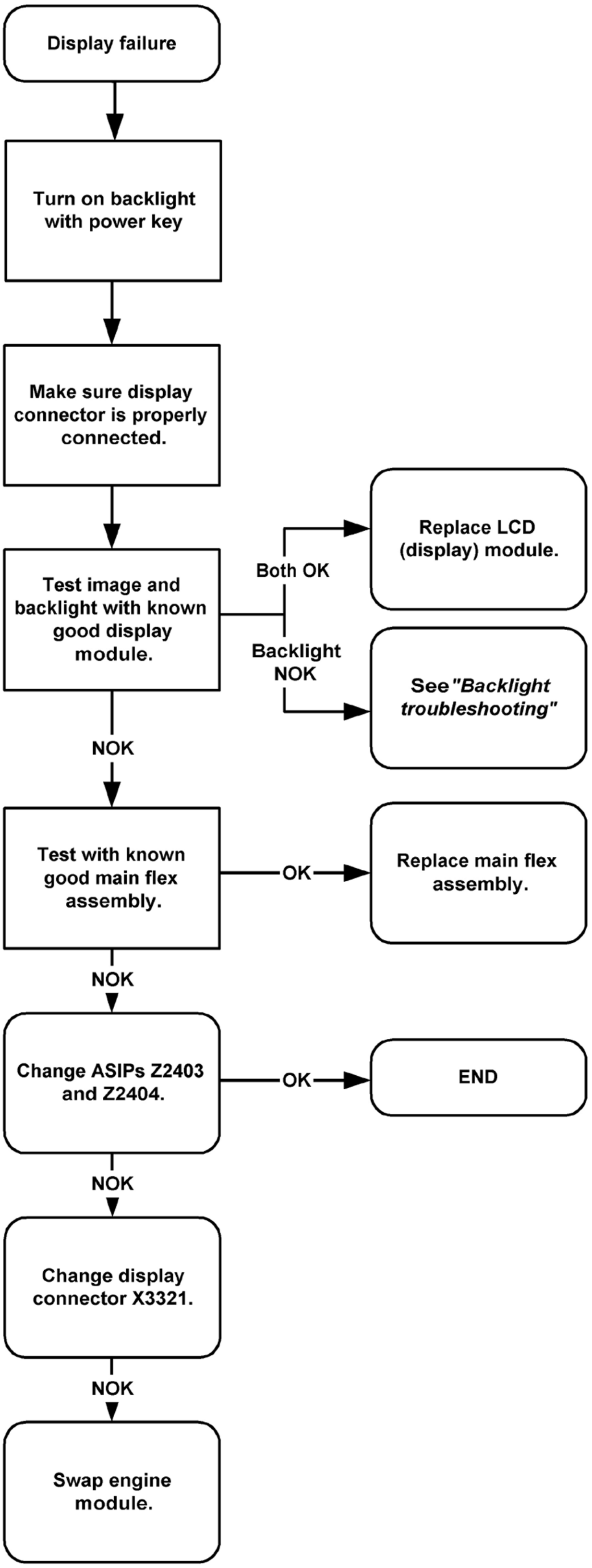
2. Check that the cellular engine is working normally.
   - i To check the functionality, connect the phone to a docking station.
   - ii Start *Phoenix* service software.
   - iii Read the phone information to check that also the application engine is functioning normally (you should be able to read the APE ID).

3. Proceed to the display troubleshooting flowcharts.

   Use the **Display Test** tool in *Phoenix* to find the detailed fault mode.

Display fault troubleshooting

Troubleshooting flow


Display failure
Turn on backlight with power key
Make sure display connector is properly connected.
Test image and backlight with known good display module.
Both OK
Replace LCD (display) module.
Backlight NOK
See "*Backlight troubleshooting*"
NOK
Test with known good main flex assembly.
OK
Replace main flex assembly.
NOK
Change ASIPs Z2403 and Z2404.
OK
END
NOK
Change display connector X3321.
NOK
Swap engine module.

See also

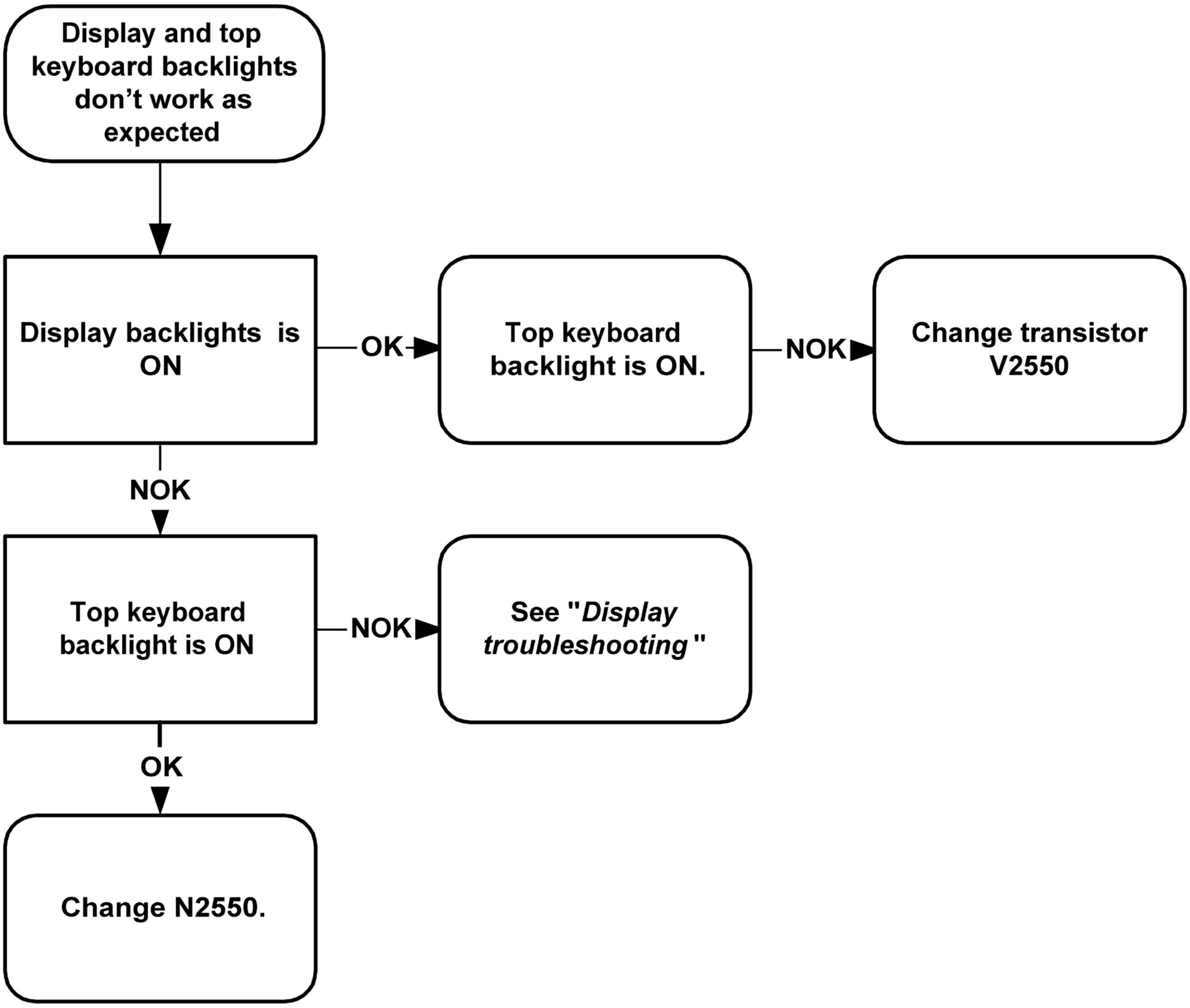
- Display and keyboard backlight troubleshooting (page)
- OMAP1710 troubleshooting (page)

Display and top keyboard backlight troubleshooting

Context

The device has one LED driver that provides current for both display and keyboard backlights.

Troubleshooting flow

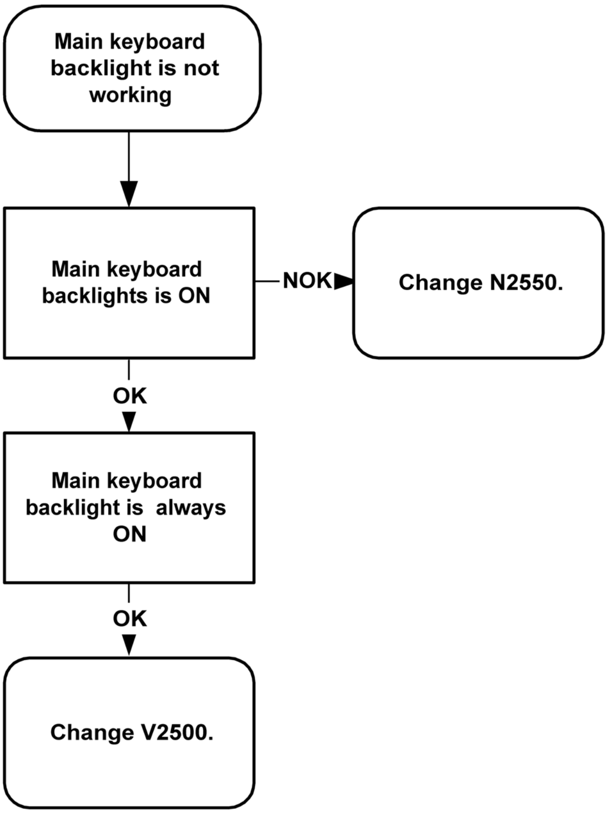

Display and top keyboard backlights don't work as expected
Display backlights is ON
OK
Top keyboard backlight is ON.
NOK
Change transistor V2550
NOK
Top keyboard backlight is ON
NOK
See "*Display troubleshooting*"
OK
Change N2550.

Main keyboard backlight troubleshooting

Context

The device has one LED driver that provides current for the main keyboard backlights.

Troubleshooting flow


Main keyboard backlight is not working
Main keyboard backlights is ON
NOK
Change N2550.
OK
Main keyboard backlight is always ON
OK
Change V2500.

Audio troubleshooting

Audio troubleshooting test instructions

Differential external earpiece and internal earpiece outputs can be measured either with a single-ended or a differential probe.

When measuring with a single-ended probe each output is measured against the ground.

Internal handsfree output is measured using a current probe, if a special low-pass filter designed for measuring a digital amplifier is not available. Note also that when using a current probe, the input signal frequency must be set to 2kHz.

The input signal for each loop test can be either single-ended or differential.

Required equipment

The following equipment is needed for the tests:

- Oscilloscope
- Function generator (sine waveform)
- Current probe (Internal handsfree DPMA output measurement)
- Phoenix service software
- Battery voltage 3.7V

Test procedure

Audio can be tested using the Phoenix audio routings option. Three different audio loop paths can be activated:

- External microphone to Internal earpiece
- External microphone to Internal handsfree speaker
- Internal microphone to External earpiece

Each audio loop sets routing from the specified input to the specified output enabling a quick in-out test. Loop path gains are fixed and they cannot be changed using Phoenix. Correct pins and signals for each test are presented in the following table.

Phoenix audio loop tests and test results

The results presented in the table apply when no accessory is connected and battery voltage is set to 3.7V.

Earpiece, internal microphone and speaker are in place during measurement. Applying a headset accessory during measurement causes a significant drop in measured quantities.

The gain values presented in the table apply for a differential output vs. single-ended/differential input.

Loop test	Input terminal	Output terminal	Path gain [dB] (fixed)	Input voltage [mVp-p]	Differential output voltage [mVp-p]	Output DC level [V]	Output current [mA]
External Mic to External Earpiece	XMICP and GND	HSEAR R P, HSEAR R N and GND	-2.9	1000	720	1.2	NA
		HSEAR P, HSEAR N and GND					
	XMICN and GND	HSEAR R P, HSEAR R N and GND					
		HSEAR P, HSEAR N and GND					
External Mic to Internal Earpiece	XMICP and GND	EarP and GND	-4.5	1000	600	1.2	NA
		EarN and GND					
	XMICN and GND	EarP and GND					
		EarN and GND					
External Mic to Internal handsfree	XMICP and GND	B2102 pads	-5	1000	560	0	25mA (calc.)
	XMICN and GND	B2102 pads					

Loop test	Input terminal	Output terminal	Path gain [dB] (fixed)	Input voltage [mVp-p]	Differential output voltage [mVp-p]	Output DC level [V]	Output current [mA]
Internal Mic to External Earpiece	B2100 (OUT/ GND)	HSEAR R P, HSEAR R N and GND	22.7	100	1360	1.2	NA
		HSEAR P, HSEAR N and GND					
		HSEAR R P, HSEAR R N and GND					
		HSEAR P, HSEAR N and GND					

Measurement data

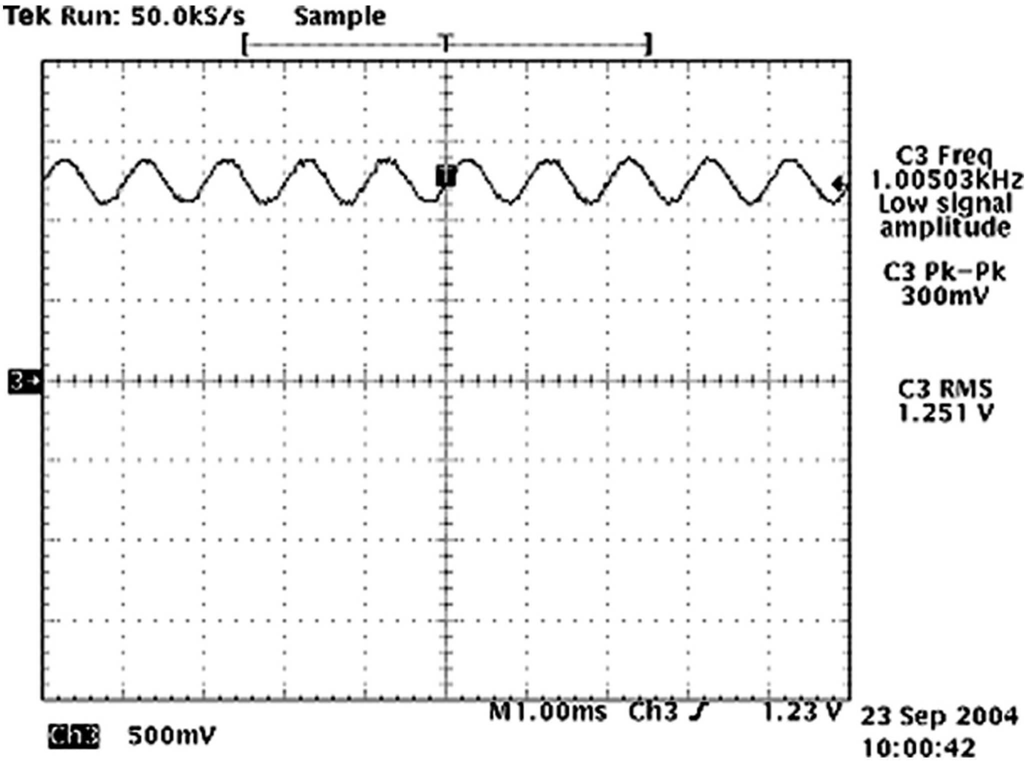
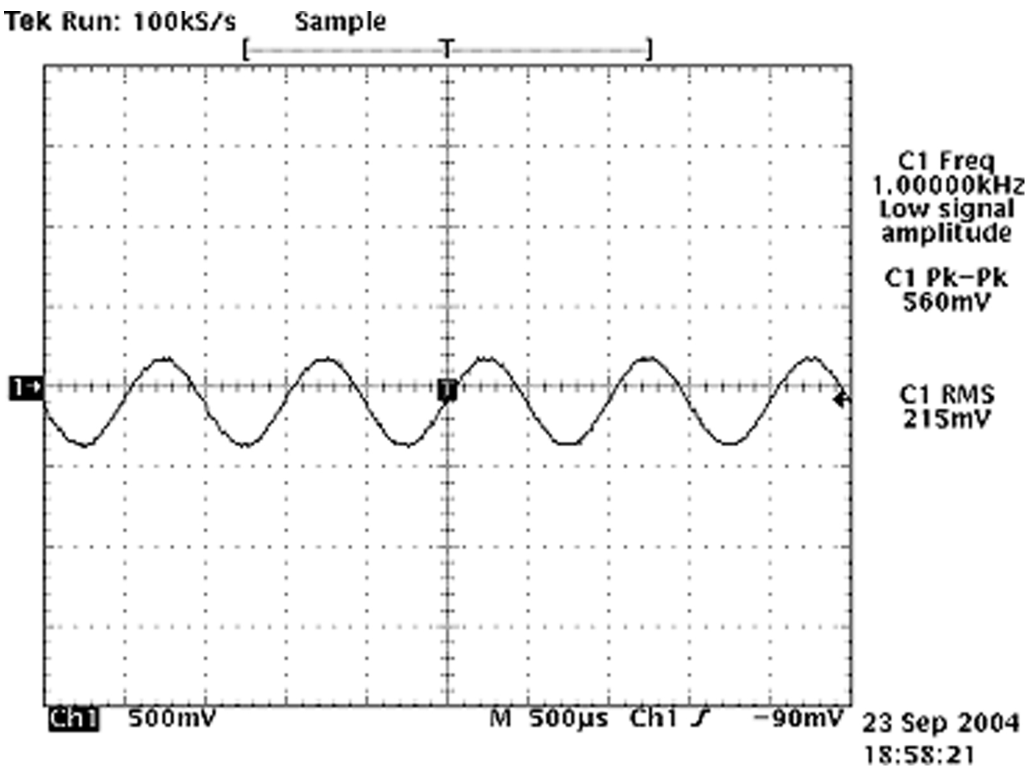


Figure 49 Single-ended output waveform of the Ext_in_HP_out measurement when earpiece is connected.



Legend

If a special low-pass filter designed for measuring digital amplifiers is unavailable, the measurement must be performed with a current probe and the input signal frequency must be 2kHz.

Figure 50 Differential output waveform of the Ext_in_IHF_out out loop measurement when speaker is connected.

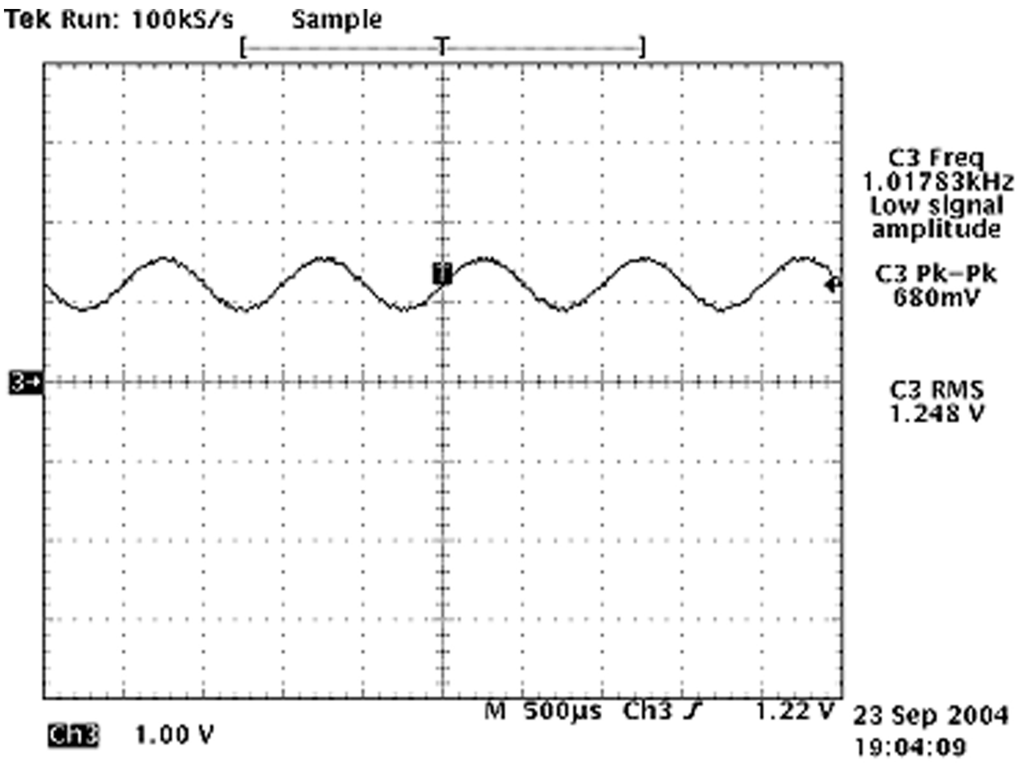
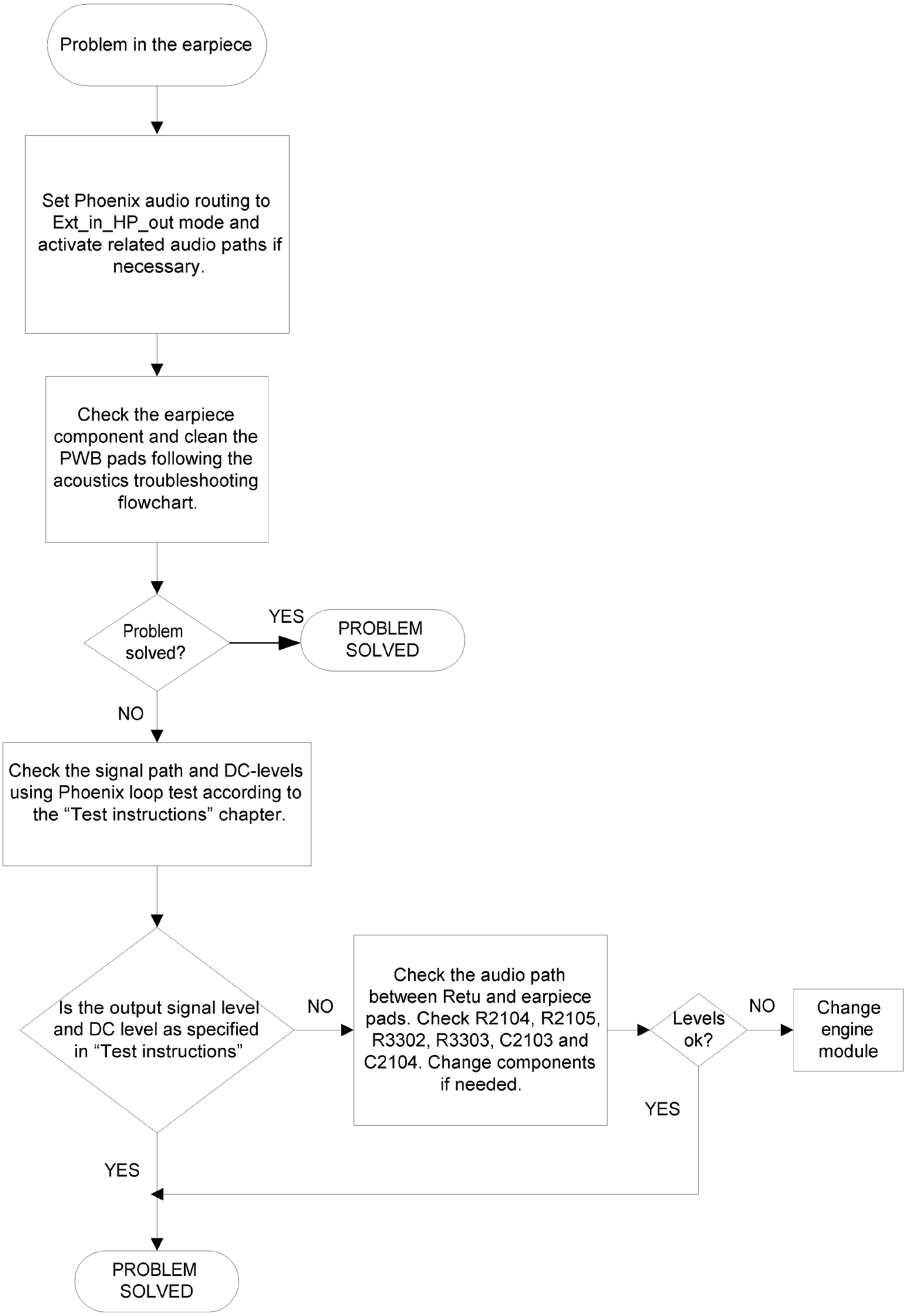


Figure 51 Single-ended output waveform of the HP_in_Ext_out loop when microphone is connected.

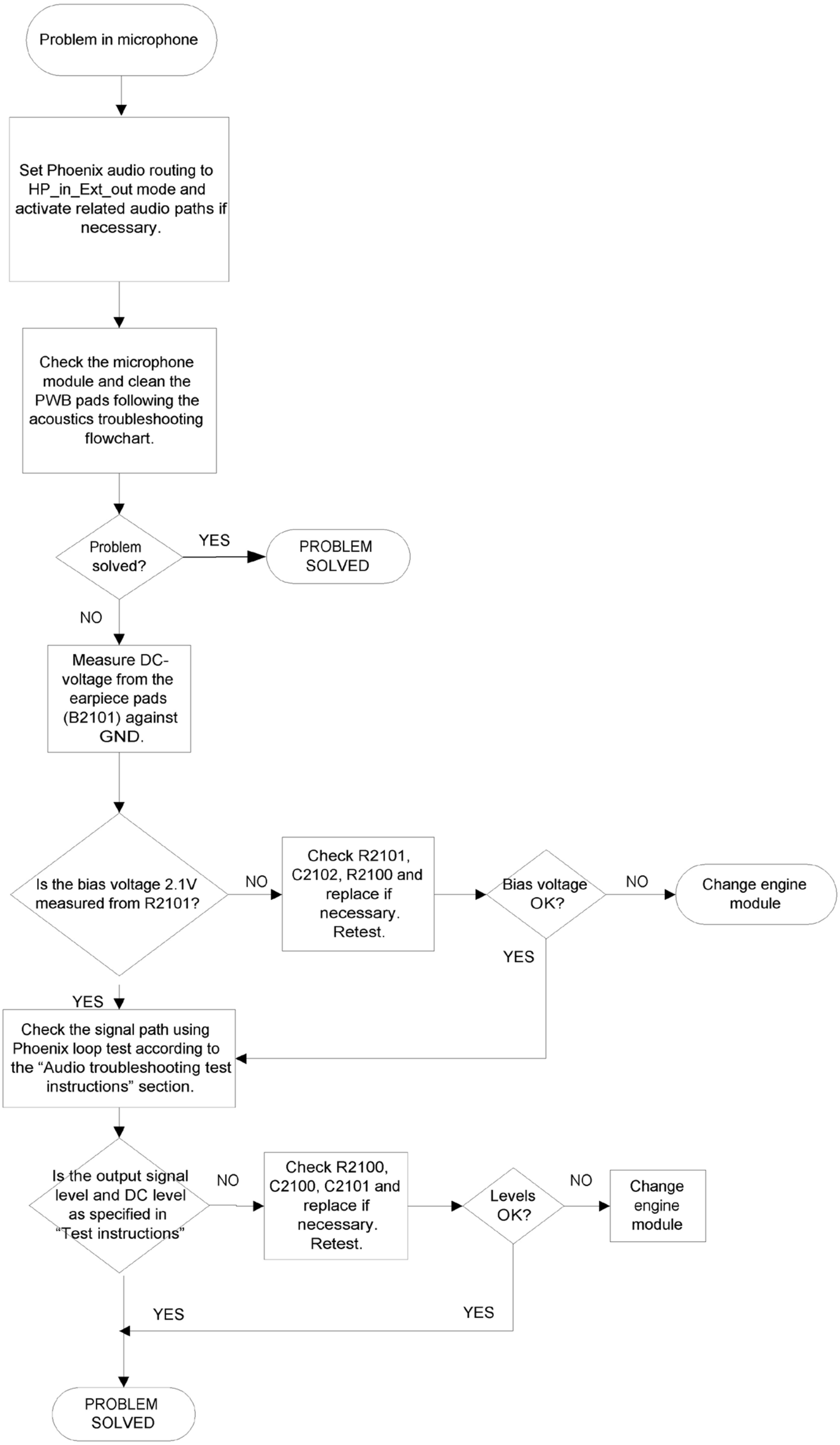
Internal earpiece troubleshooting

Troubleshooting flow


Problem in the earpiece
Set Phoenix audio routing to Ext_in_HP_out mode and activate related audio paths if necessary.
Check the earpiece component and clean the PWB pads following the acoustics troubleshooting flowchart.
Problem solved?
YES
PROBLEM SOLVED
NO
Check the signal path and DC-levels using Phoenix loop test according to the "Test instructions" chapter.
Is the output signal level and DC level as specified in "Test instructions"
NO
Check the audio path between Retu and earpiece pads. Check R2104, R2105, R3302, R3303, C2103 and C2104. Change components if needed.
Levels ok?
NO
Change engine module
YES
YES
PROBLEM SOLVED

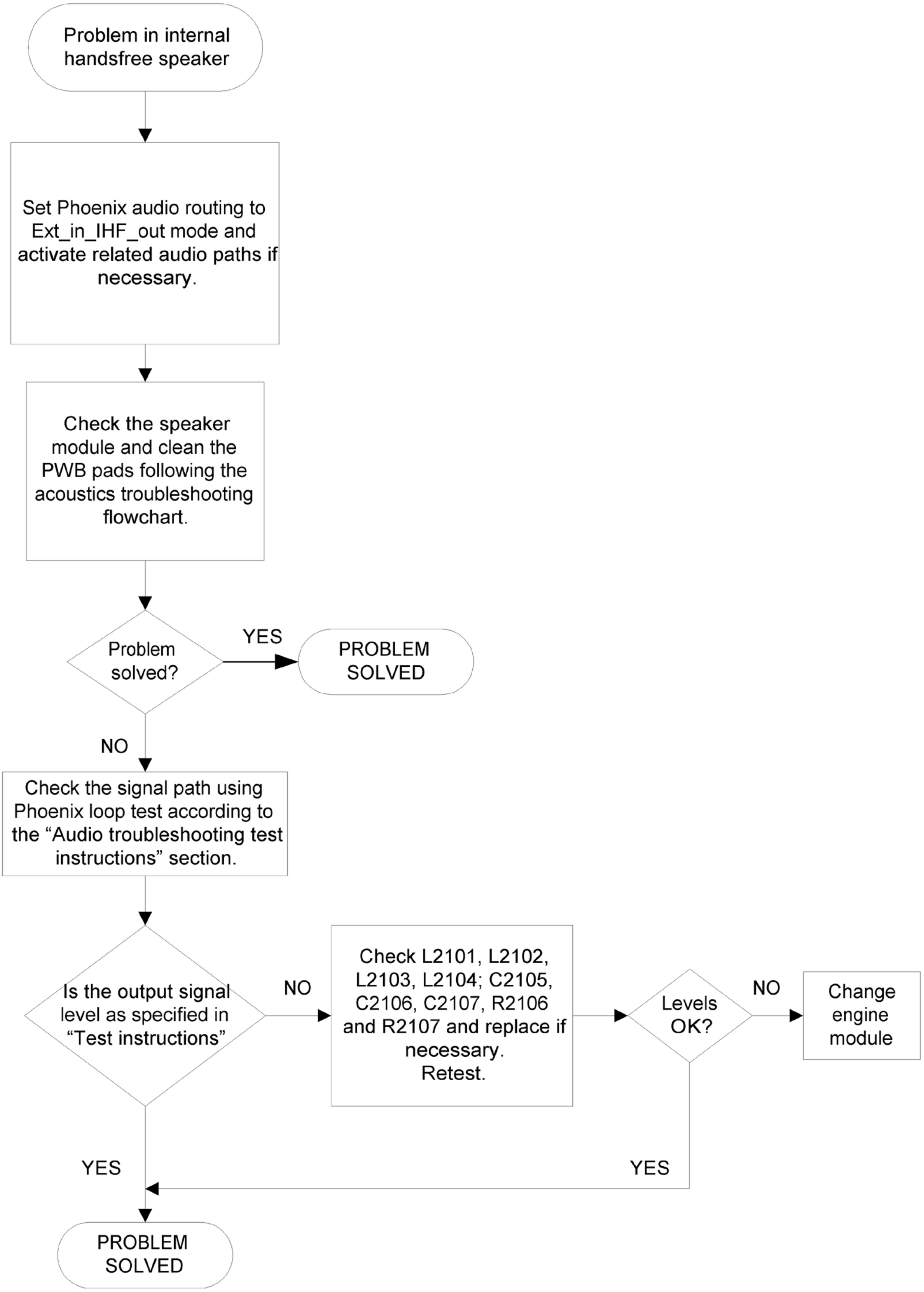
Internal microphone troubleshooting

Troubleshooting flow


Problem in microphone
Set Phoenix audio routing to HP_in_Ext_out mode and activate related audio paths if necessary.
Check the microphone module and clean the PWB pads following the acoustics troubleshooting flowchart.
Problem solved?
YES
PROBLEM SOLVED
NO
Measure DC-voltage from the earpiece pads (B2101) against GND.
Is the bias voltage 2.1V measured from R2101?
NO
Check R2101, C2102, R2100 and replace if necessary. Retest.
Bias voltage OK?
NO
Change engine module
YES
YES
Check the signal path using Phoenix loop test according to the "Audio troubleshooting test instructions" section.
Is the output signal level and DC level as specified in "Test instructions"
NO
Check R2100, C2100, C2101 and replace if necessary. Retest.
Levels OK?
NO
Change engine module
YES
YES
PROBLEM SOLVED

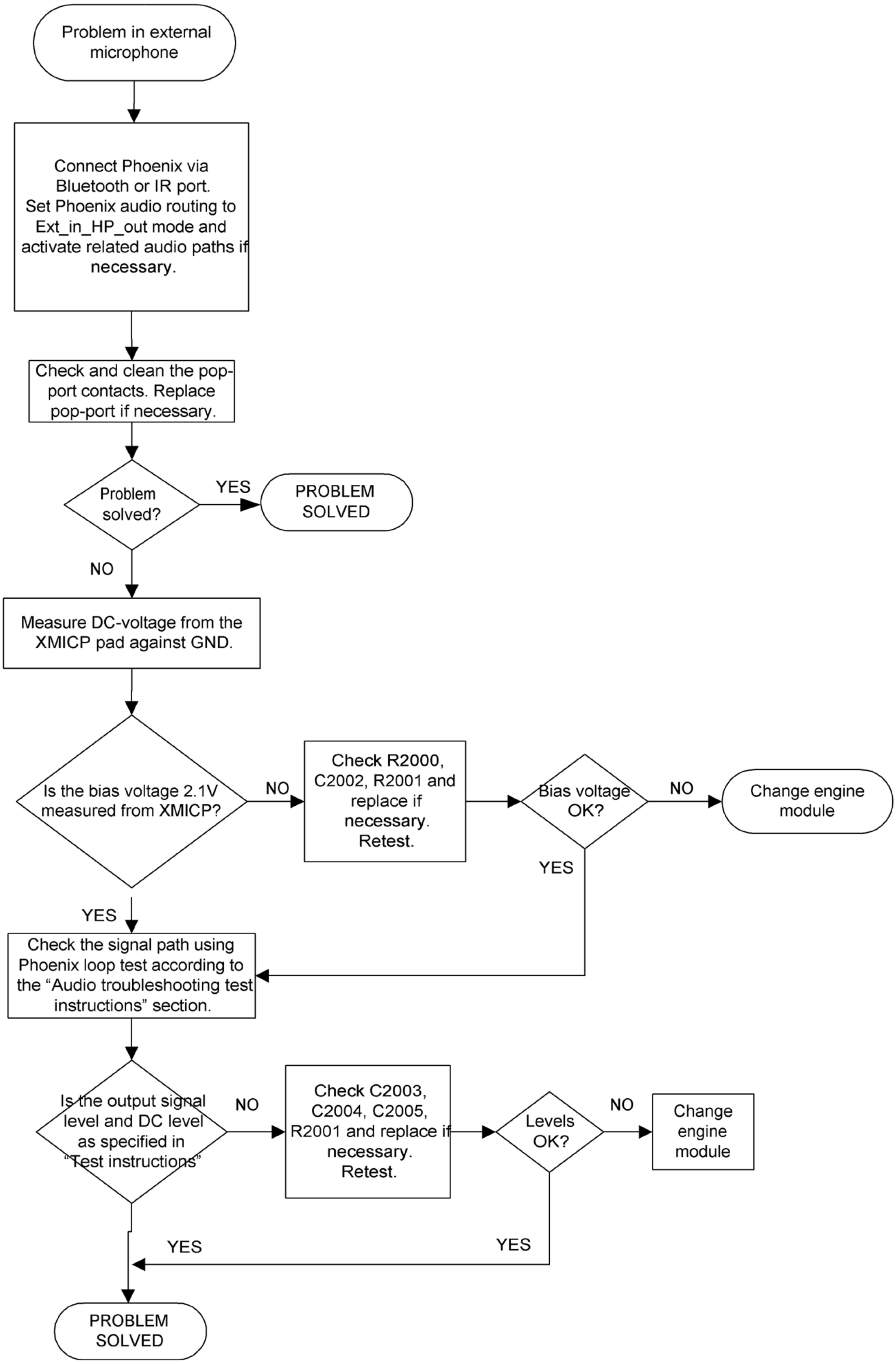
IHF troubleshooting

Troubleshooting flow


Problem in internal handsfree speaker
Set Phoenix audio routing to Ext_in_IHF_out mode and activate related audio paths if necessary.
Check the speaker module and clean the PWB pads following the acoustics troubleshooting flowchart.
Problem solved?
YES
PROBLEM SOLVED
NO
Check the signal path using Phoenix loop test according to the “Audio troubleshooting test instructions” section.
Is the output signal level as specified in “Test instructions”
NO
Check L2101, L2102, L2103, L2104; C2105, C2106, C2107, R2106 and R2107 and replace if necessary. Retest.
Levels OK?
NO
Change engine module
YES
YES
PROBLEM SOLVED

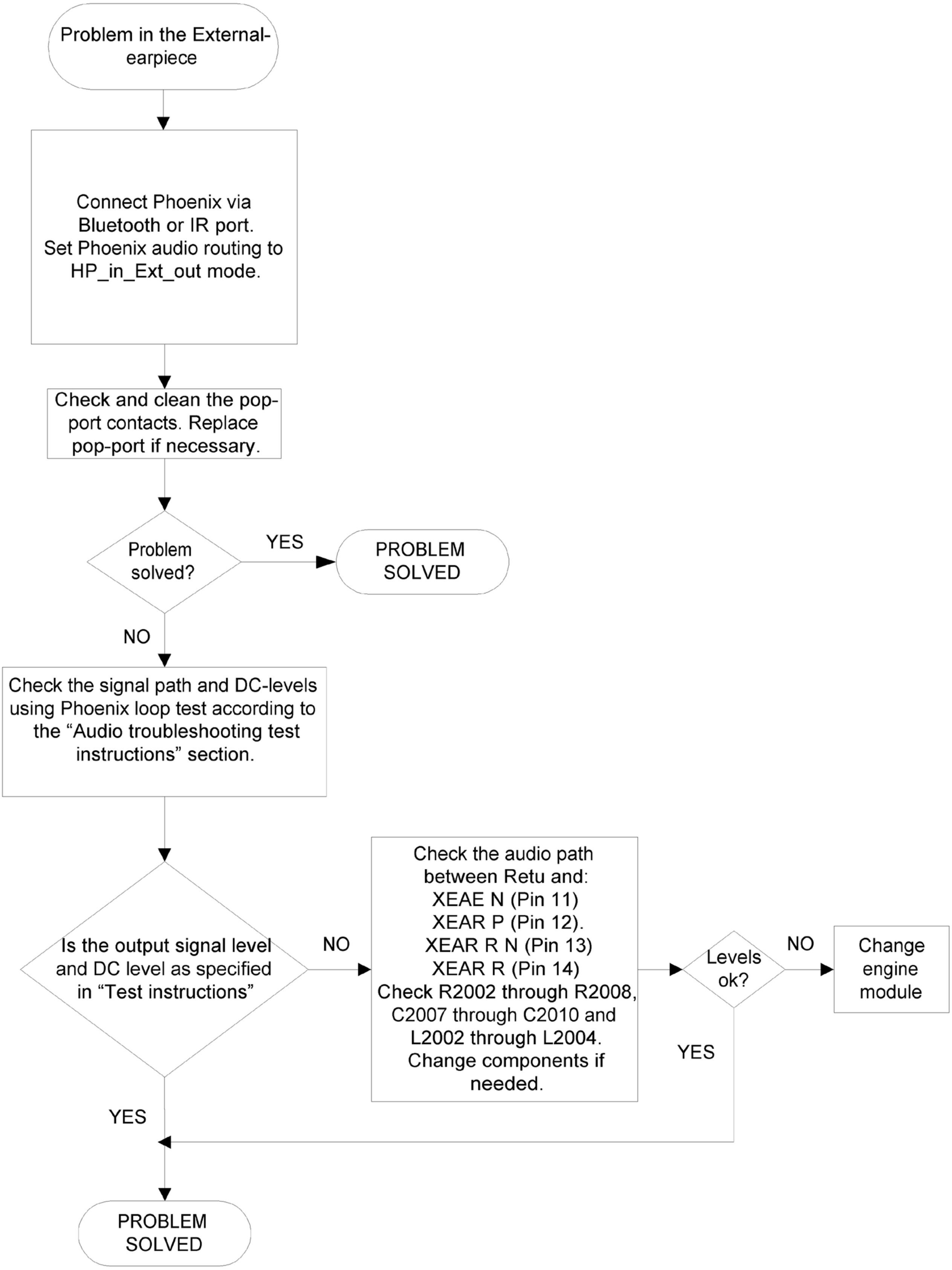
External microphone troubleshooting

Troubleshooting flow


Problem in external microphone
Connect Phoenix via Bluetooth or IR port. Set Phoenix audio routing to Ext_in_HP_out mode and activate related audio paths if necessary.
Check and clean the pop-port contacts. Replace pop-port if necessary.
Problem solved?
YES
PROBLEM SOLVED
NO
Measure DC-voltage from the XMICP pad against GND.
Is the bias voltage 2.1V measured from XMICP?
NO
Check R2000, C2002, R2001 and replace if necessary. Retest.
Bias voltage OK?
NO
Change engine module
YES
YES
Check the signal path using Phoenix loop test according to the "Audio troubleshooting test instructions" section.
Is the output signal level and DC level as specified in "Test instructions"
NO
Check C2003, C2004, C2005, R2001 and replace if necessary. Retest.
Levels OK?
NO
Change engine module
YES
YES
PROBLEM SOLVED

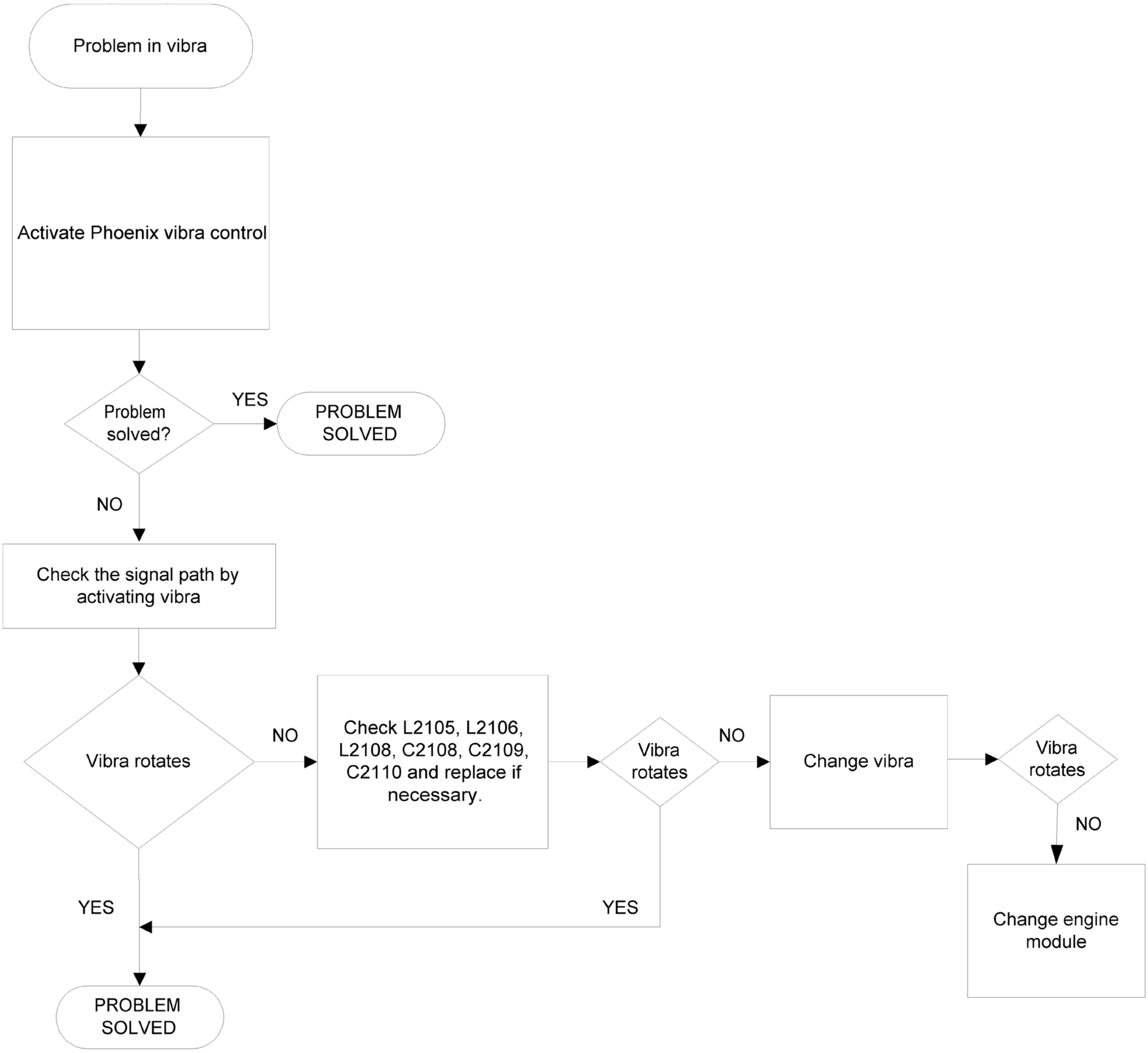
External earpiece troubleshooting

Troubleshooting flow


Problem in the External-earpiece
Connect Phoenix via Bluetooth or IR port. Set Phoenix audio routing to HP_in_Ext_out mode.
Check and clean the pop-port contacts. Replace pop-port if necessary.
Problem solved?
YES
PROBLEM SOLVED
NO
Check the signal path and DC-levels using Phoenix loop test according to the "Audio troubleshooting test instructions" section.
Is the output signal level and DC level as specified in "Test instructions"
NO
Check the audio path between Retu and: XEAE N (Pin 11) XEAR P (Pin 12). XEAR R N (Pin 13) XEAR R (Pin 14) Check R2002 through R2008, C2007 through C2010 and L2002 through L2004. Change components if needed.
Levels ok?
NO
Change engine module
YES
YES
PROBLEM SOLVED

Vibra troubleshooting

Troubleshooting flow


Problem in vibra
Activate Phoenix vibra control
Problem solved?
YES
PROBLEM SOLVED
NO
Check the signal path by activating vibra
Vibra rotates
NO
Check L2105, L2106, L2108, C2108, C2109, C2110 and replace if necessary.
Vibra rotates
NO
Change vibra
Vibra rotates
NO
Change engine module
YES
YES
PROBLEM SOLVED

Baseband manual tuning guide

Energy management calibration

Before you begin

Energy Management (EM) calibration is performed to calibrate the setting (gain and offset) of AD converters in several channels (that is, **battery voltage**, **BSI**, **battery current**) to get an accurate AD conversion result.

Hardware setup:

- An external power supply is needed.
- Supply 12V DC from an external power supply to CU-4 to power up the phone.

- The phone must be connected to a CU-4 control unit with a product-specific flash adapter.

Steps

1. Place the phone to the docking station adapter (CU-4 is connected to the adapter).
2. Start *Phoenix* service software.
3. Choose **File→ Scan Product.** .
4. Choose **Tuning→Energy Management Calibration.**
5. To show the current values in the phone memory, click **Read**, and check that communication between the phone and CU-4 works.
6. Check that the **CU-4 used** check box is checked.
7. Select the item(s) to be calibrated.

   Note: ADC calibration has to be performed before other item(s). However, if all calibrations are selected at the same time, there is no need to perform the ADC calibration first.
8. Click **Calibrate**.

   The calibration of the selected item(s) is carried out automatically.

   The candidates for the new calibration values are shown in the *Calculated values* column. If the new calibration values seem to be acceptable (please refer to the following "Calibration value limits" table), click **Write** to store the new calibration values to the phone permanent memory.

Table 12 Calibration value limits

Parameter	Min.	Max.
ADC Offset	-20	20
ADC Gain	12000	14000
BSI Gain	1100	1300
VBAT Offset	2400	2650
VBAT Gain	19000	23000
VCHAR Gain	N/A	N/A
IBAT (ICal) Gain	7750	12250

9. Click **Read** and confirm that the new calibration values are stored in the phone memory correctly. If the values are not stored to the phone memory, click **Write** and/or repeat the procedure again.
10. To end the procedure, close the *Energy Management Calibration* window.

7 — Camera Module Troubleshooting

(This page left intentionally blank.)

Table of Contents

Introduction to camera module troubleshooting....7-5
The effect of image taking conditions on image quality....7-6
Camera construction....7-10
Image quality analysis 7-12
  Testing for dust in camera module....7-12
  Testing camera image sharpness....7-14
  Dirty camera lens protection window....7-14
  Image bit errors....7-15
Camera troubleshooting flowcharts....7-16
  Back camera troubleshooting....7-16
    Camera hardware failure message troubleshooting....7-16
    Camera baseband HW troubleshooting....7-17
    Camera viewfinder troubleshooting....7-18
    Bad camera image quality troubleshooting....7-19
  Front camera troubleshooting....7-20
    Front camera hardware failure message troubleshooting....7-20
    Front camera HW baseband troubleshooting....7-21
    Front camera bad image quality troubleshooting....7-23
Flash LED troubleshooting....7-23
  Introduction to flash LED troubleshooting....7-23
  Flash LED and image taking conditions....7-24
  Analysing image quality....7-29
    Possible faults in image quality....7-29
    Testing flash module functionality....7-29
    Testing image colours with flash....7-29
    Testing flash power....7-29
  Flash LED troubleshooting flowcharts....7-30
    Flash LED HW baseband troubleshooting....7-30

List of Tables

Table 13 Camera specifications....7-10

List of Figures

Figure 52 Blurred image. Target too close....7-6
Figure 53 Blurring caused by shaking hands....7-7
Figure 54 Near objects get skewed when taking images from a moving vehicle....7-7
Figure 55 Noisy image taken in +70 degrees Celsius....7-8
Figure 56 Image taken against light....7-8
Figure 57 Flicker in an image; object illuminated by strong fluorescent light....7-9
Figure 58 A lens reflection effect caused by sunshine....7-9
Figure 59 Good image taken indoors....7-10
Figure 60 Good image taken outdoors....7-10
Figure 61 Camera module cross section and assembly principle....7-11
Figure 62 Camera module bottom view including serial numbering....7-12
Figure 63 Effects of dust on optical path....7-13
Figure 64 Image taken with clean protection window....7-15
Figure 65 Image taken with greasy protection window....7-15
Figure 66 Bit errors caused by JPEG compression....7-15

Figure 67 Example of a good quality image taken with the flash LED........7–24
Figure 68 overexposed image........7–25
Figure 69 Dark and noisy image........7–26
Figure 70 Shaken image........7–27
Figure 71 Camera white balance failure and overexposure........7–28
Figure 72 Color difference between flash colour limit samples........7–28

Introduction to camera module troubleshooting

Background, tools and terminology

Faults or complaints in camera operation can be roughly categorised into three subgroups:

1. Camera is not functional at all; no image can be taken.
2. Images can be taken but there is nothing recognizable in them.
3. Images can be taken and they are recognizable but for some reason the quality of images is seriously degraded.

Image quality is very hard to measure quantitatively, and even comparative measurements are difficult (comparing two images) to do, if the difference is small. Especially if the user is not satisfied with his/her device's image quality, and tells, for example, that the images are not sharp, it is fairly difficult to accurately test the device and get an exact figure which would tell whether the device is functioning properly.

Often subjective evaluation has to be used for finding out if a certain property of the camera is acceptable or not. Some training or experience of a correctly operating reference device may be needed in order to detect what actually is wrong.

It is easy for the user to take bad images in bad conditions. Therefore the camera operation has to be checked always in constant conditions (lighting, temperature) or by using a second, known-to-be good device as reference.

When checking for possible errors in camera functionality, knowing what error is suspected significantly helps the testing by narrowing down the amount of test cases. The following types of image quality problems may be expected to appear:

- Dust (black spots)
- Lack of sharpness
- Bit errors

Terms

Dynamic range	Camera's ability to capture details in dark and bright areas of the scene simultaneously.
Exposure time	Camera modules use silicon sensor to collect light and for forming an image. The imaging process roughly corresponds to traditional film photography, in which exposure time means the time during which the film is exposed to light coming through optics. Increasing the time will allow for more light hitting the film and thus results in brighter image. The operation principle is exactly the same with silicon sensor, but the shutter functionality is handled electronically i.e. there is no mechanical moving parts like in film cameras.
Flicker	Phenomenon, which is caused by pulsating in scene lighting, typically appearing as wide horizontal stripes in an image.
Noise	Variation of response between pixels with same level of input illumination.
Resolution	Usually the amount of pixels in the camera sensor; for example, RM-78 has a 1600 x 1200 pixel sensor resolution. In some occasions the term resolution is used for describing the sharpness of the images.

Sensitivity	Camera module's sensitivity to light. In equivalent illumination conditions, a less sensitive camera needs a longer exposure time to gather enough light in forming a good image. Analogous to ISO speed in photographic film.
Sharpness	Good quality images are 'sharp' or 'crisp', meaning that image details are well visible in the picture. However, certain issues, such as non-idealities in optics or high levels of digital zoom, cause image blurring, making objects in picture to appear 'soft'. Each camera type typically has its own level of performance.

The effect of image taking conditions on image quality

There are some factors, which may cause poor image quality, if not taken into account by the end user when shooting images, and thus may result in complaints. The items listed are normal to camera operation and are not a reason for changing the camera module.

Distance to target

The lens in the module is specified to operate satisfactorily from 70 cm to infinite distance of scene objects. In practice, the operation is such that close objects may be noticed to get more blurred when distance to them is shorter than 70 cm. The lack of sharpness is first visible in full resolution images. If observing just the viewfinder, even very close objects may seem to appear sharp. This is normal; do not change the camera module.

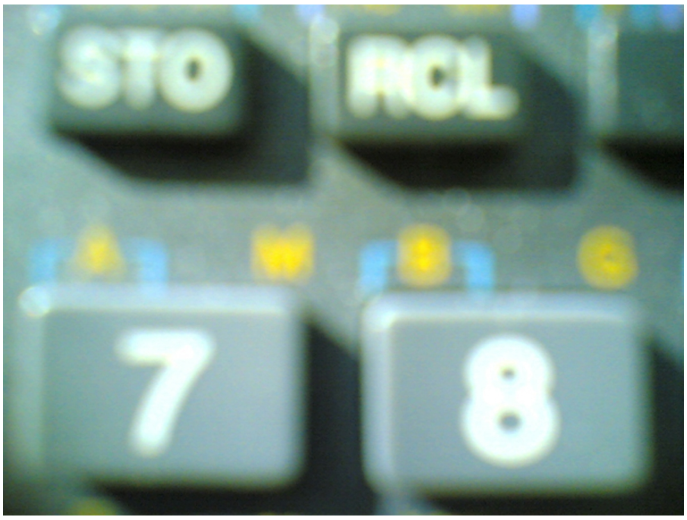


Figure 52 Blurred image. Target too close.

The amount of light available

In dim conditions camera runs out of sensitivity. The exposure time is long (especially in the night mode) and the risk of getting shaken (= blurred) images increases. In addition, image noise level grows. The maximum exposure time in the night mode is ¼ seconds. Therefore, images need to be taken with extreme care and by supporting the phone when the amount of light reflected from the target is low. Because of the longer exposure time and larger gain value, noise level increases in low light conditions. Sometimes blurring may even occur in daytime, if the image is taken very carelessly. See the figure below for an example. This is normal; do not change the camera module.

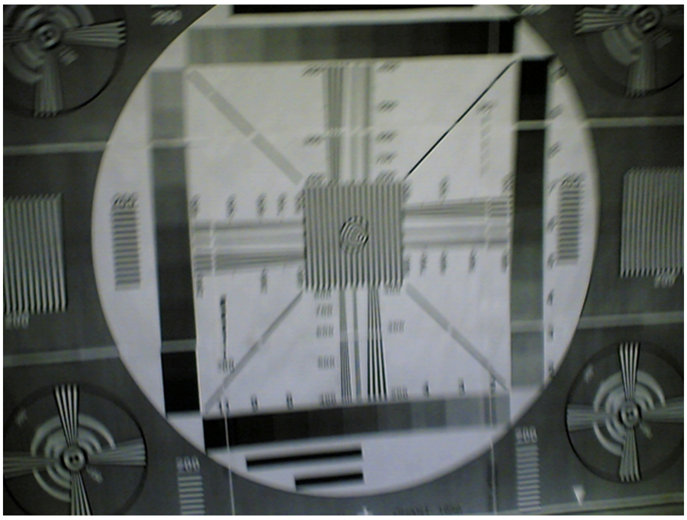


Figure 53 Blurring caused by shaking hands

Movement in bright light

If an image is taken of moving objects or if the device is used in a moving vehicle, object 'skewing' or 'tilting' may occur. This phenomenon is fundamental to most CMOS camera types, and usually cannot be avoided. The movement of camera or object sometimes cause blurring indoors or in dim lighting conditions because of long exposure time. This is normal; do not change the camera module.

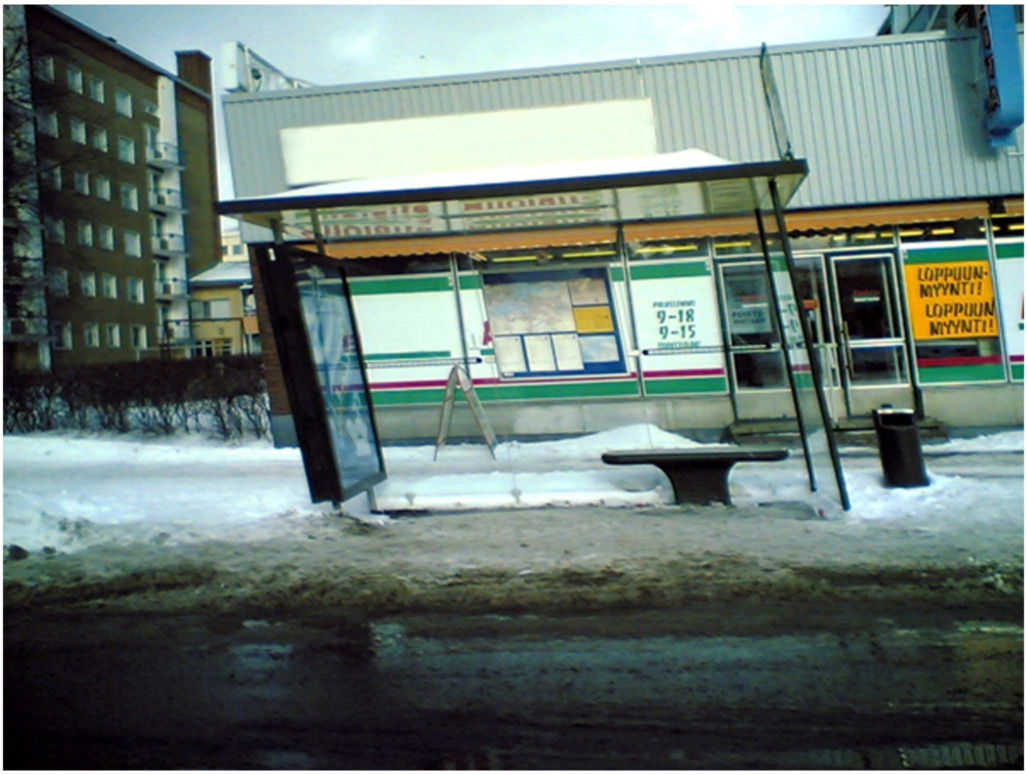


Figure 54 Near objects get skewed when taking images from a moving vehicle

Temperature

High temperatures inside the mobile phone cause more noise to appear in images. For example, in +70 degrees (Celsius), the noise level may be very high, and it further grows if the conditions are dim. If the phone processor has been heavily loaded for a long time before taking an image, the phone might have considerably higher temperature inside than in the surrounding environment. This is also normal to camera operation; do not change the camera module.

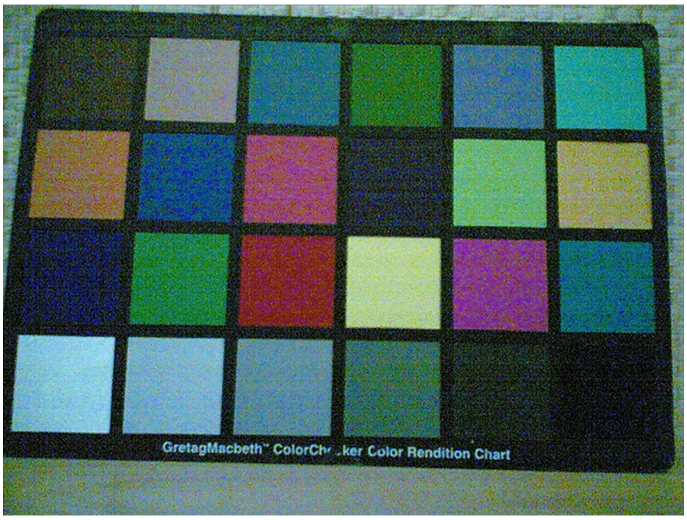


Figure 55 Noisy image taken in +70 degrees Celsius

Phone display

If the display contrast is set too dark, the image quality degrades: the images may be very dark depending on the setting. If the display contrast is set too bright, image contrast appears bad and "faint". This problem is solved by setting the display contrast correctly. This is normal behaviour; do not change the camera module.

Basic rules of photography (especially shooting against light)

Because of dynamic range limitations, taking images against bright light might cause either saturated image or the actual target appear too dark. In practice, this means that when taking an image indoors and having, for example, a window behind the object, the result is usually poor. This is normal behaviour; do not change the camera module.

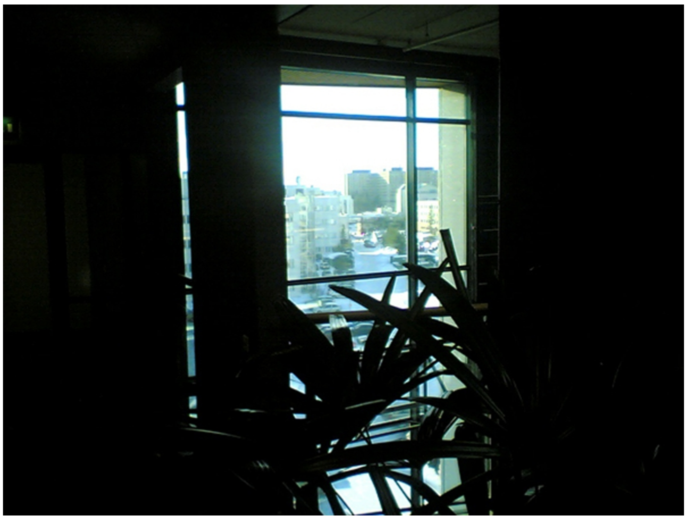


Figure 56 Image taken against light

Flicker

In some occasions a bright fluorescent light may cause flicker in the viewfinder and captured image. This phenomenon may also be a result, if images are taken indoors under the mismatch of 50/60 Hz electricity network frequency. The electricity frequency used is automatically detected by the camera module. In some very few countries, both 50 and 60 Hz networks are present and thus probability for the phenomenon increases. Flickering occurs also under high artificial illumination level. This is normal behaviour; do not change the camera module.

Figure 57 Flicker in an image; object illuminated by strong fluorescent light

Bright light outside of image view

Especially the sun can cause clearly visible lens glare phenomenon and poor contrast in images. This happens because of undesired reflections inside the camera optics. Generally this kind of reflections are common in all optical systems. This is normal behaviour; do not change the camera module.

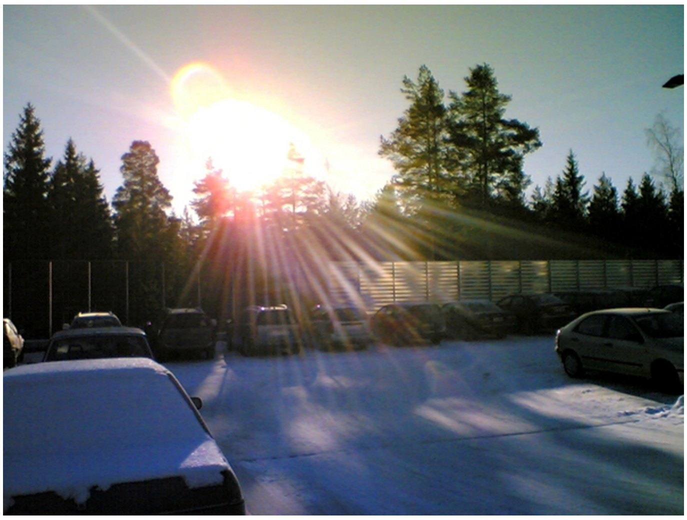


Figure 58 A lens reflection effect caused by sunshine

Examples of good quality images

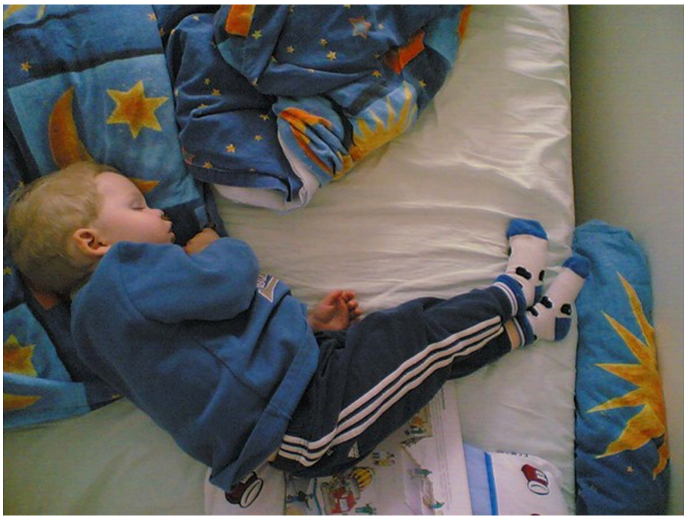


Figure 59 Good image taken indoors

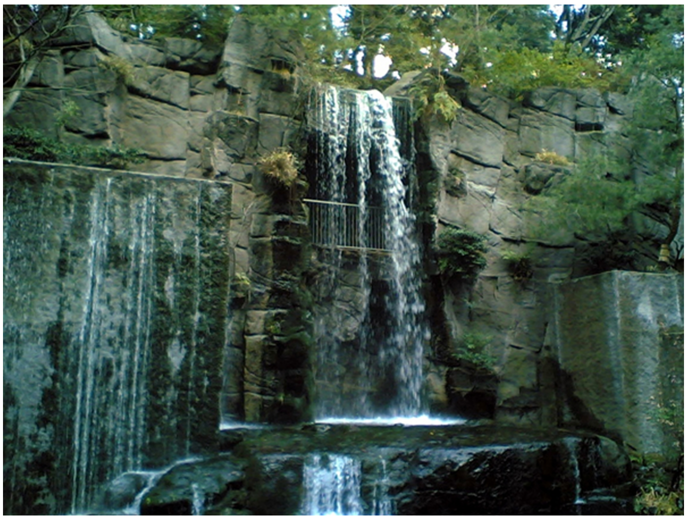


Figure 60 Good image taken outdoors

Camera construction

This section describes the mechanical construction of the camera module for getting a better understanding of the actual mechanical structure of the module.

Table 13 Camera specifications

Sensor type	CMOS Sensor
Photo detectors	1.9 million
F number/Aperture	f/3.2
Focal length	4.9mm (35mm equivalent 37mm)
Focus range	70 cm to infinity
Still Image resolutions	1600x1200, 1280x960, 640x480, 320x240, 160x1200

Still images file format	EXIF (JPEG), *.jpg
Video resolutions	640x480, 352x288, 176x144, 128x96. All at 30 frames per second
Video clip length	10 seconds or free, maximal clip length in free mode is 1 hour (limited by amount of space on external memory card)
Video file format	3GPP, *.3gp
Exposure	Automatic
White Balance	Automatic
Colours	16.7 million / 24-bit
Capture Modes	Night mode, Sequence mode, self timer

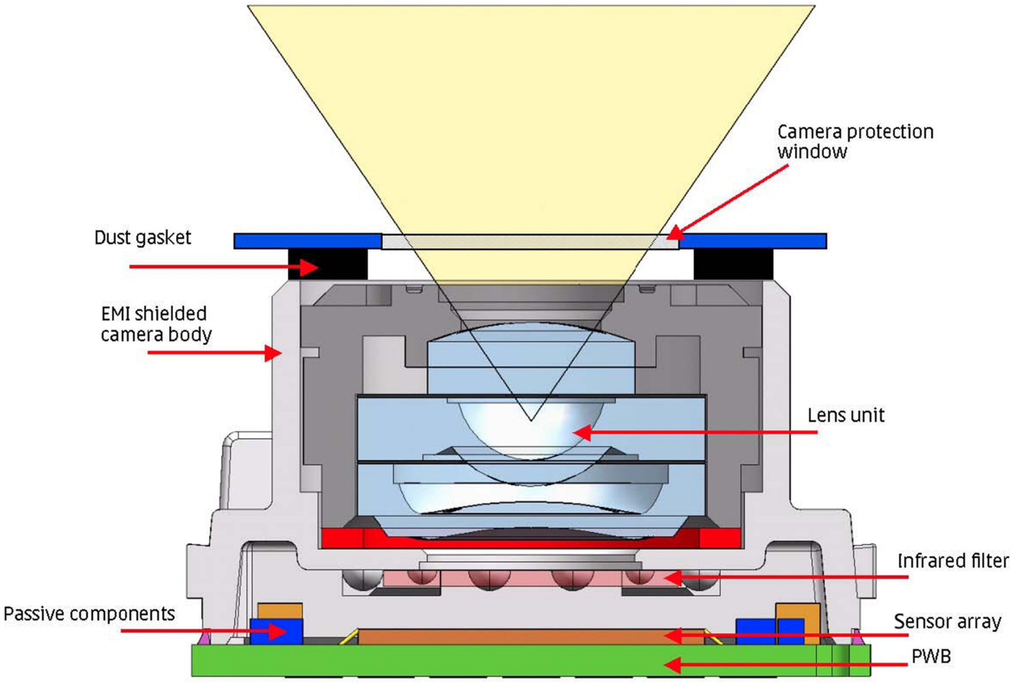

Camera protection window
Dust gasket
EMI shielded camera body
Lens unit
Infrared filter
Passive components
Sensor array
PWB

Figure 61 Camera module cross section and assembly principle

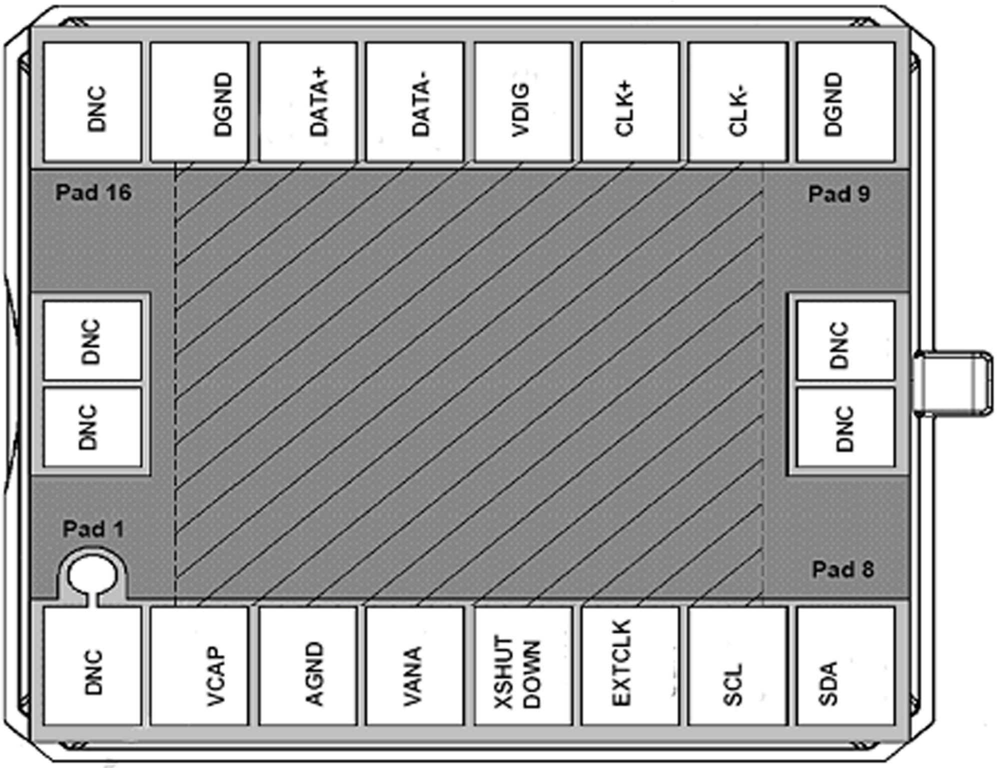


Figure 62 Camera module bottom view including serial numbering

The camera module as a component is not a repairable part, meaning that the components inside the module may not be changed. Cleaning dust from the front face is allowed only. Use clean compressed air.

The camera module uses socket type connecting. For versioning, laser marked serial numbering is used on the PWB.

The main parts of the module are:

- Lens unit including lens aperture.
- Infrared filter; used to prevent infrared light from contaminating the image colors. The IR filter is glued to the EMI shielded camera body.
- Camera body; made of conductive metallized plastic and attached to the PWB with glue.
- Sensor array including DSP functions is glued and wire-bonded to the PWB.
- PWB, FR-4 type
- Passive components
- Camera protection window; part of the phone cover mechanics
- Dust gasket between the lens unit and camera protection window

Image quality analysis

Testing for dust in camera module

Symptoms and diagnosis

For detecting these kinds of problems, take an image of a uniform white surface and analyse it in full resolution. A good quality PC monitor is preferred for analysis. Search carefully, since finding these defects is not always easy. Figure "Effects of dust on optical path" is an example image containing easily detectable dust problems.

When taking a white image, use uniformly lightened white paper or white wall. One possibility is to use uniform light but in this case make sure that the camera image is not flickering when taking the test image. In case flickering happens, try to reduce illumination level. Use JPEG image format for analysing, and set the image quality parameter to ‘High Quality’.

Black spots in an image are caused by dirt particles trapped inside the optical system. Clearly visible and sharp edged black dots in an image are typically dust particles on the image sensor. These spots are searched for in the manufacturing phase, but it is possible that the camera body cavity contains a particle, which may move onto the image sensor active surface, for example, when the phone is dropped. Thus it is also possible that the problem will disappear before the phone is brought to service. The camera should be replaced if the problem is present when the service technician analyses the phone.

If a dust particle is lying on the infrared filter surface on either side, they are hard to locate because they are out of focus, and appear in the image as large, grayish and fading-edge 'blobs'. Sometimes they are invisible to the eye, and thus the user probably does not notice them at all. However, it is possible that a larger particle disturbs the user, causing need for service.

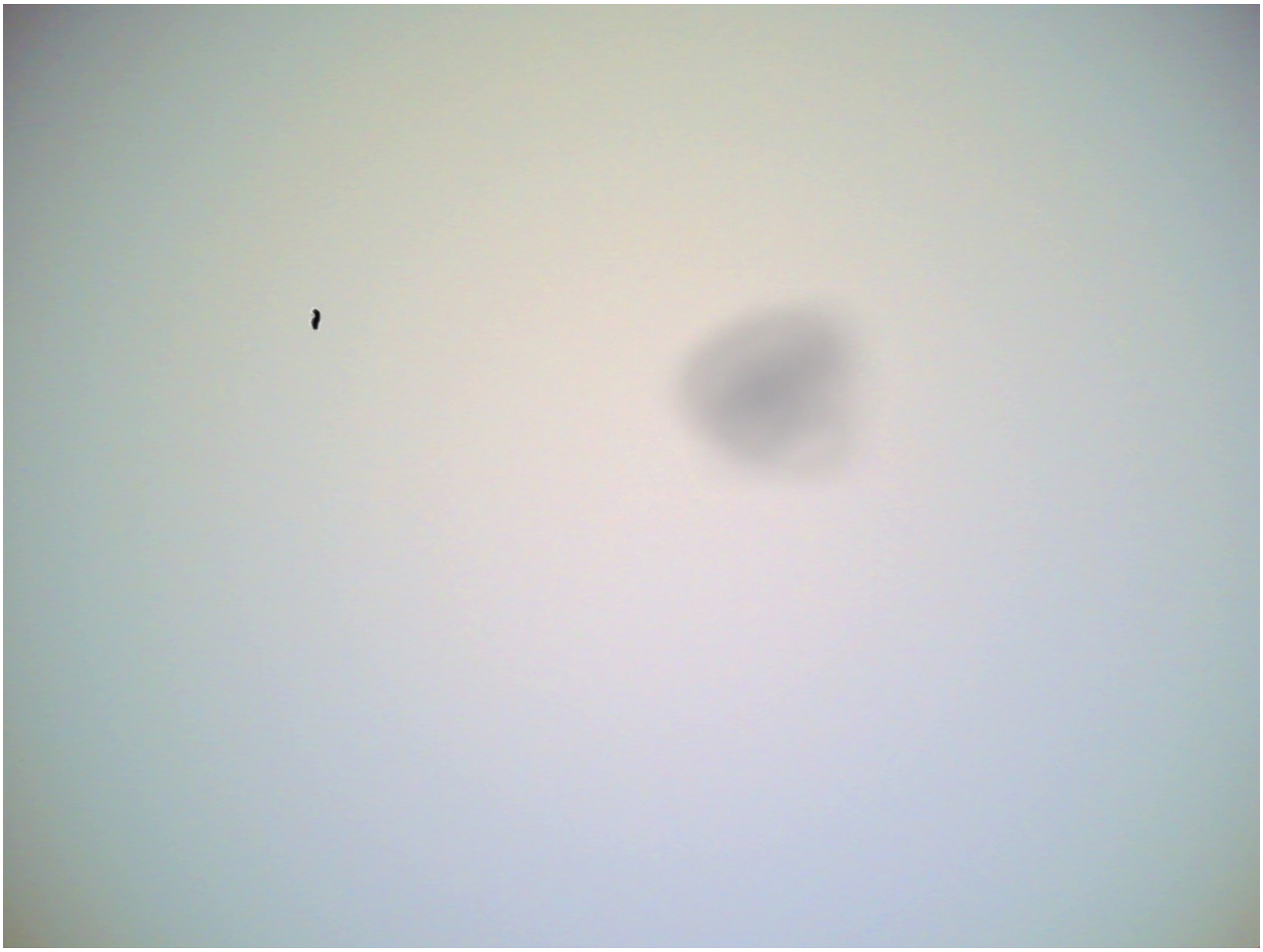


Figure 63 Effects of dust on optical path

If large dust particles get trapped on top of the lens surface in the cavity between camera window and lens, they will cause image blurring and poor contrast. The dust gasket between the window and lens should prevent any particles from getting into the cavity after the manufacturing phase. Dust in this position should be blown away by using compressed air.

Unauthorized disassembling of the product can also be the root of the problem. However, in most cases it should be possible to remove the particle(s) by using clean compressed air. Never wipe the lens surface before trying compressed air; the possibility of damaging the lens is substantial. Always check the image sharpness after removing dust.

Testing camera image sharpness

Symptoms and diagnosis

If pictures taken with a device are claimed to be blurry, there are six possible sources for the problem:

1 The protection window is fingerprinted, soiled, dirty, visibly scratched or broken.

2 The photographed object is too close – the camera lens operates with distances from 70 cm to infinity. This is no cause to replace camera module.

3 User has tried to take pictures in too dark conditions, and images are blurred due to handshake or movement. This is no cause to replace camera module.

4 There is dirt between the protection window and camera lens.

5 The protection window is defective. This can be either a manufacturing failure or caused by the user. The window should be changed.

6 The camera lens is misfocused because of a manufacturing error.

7 Very high level of digital zoom is used

A quantitative analysis of sharpness is very difficult to conduct in any other environment than optics laboratory. Therefore, subjective analysis should be used.

If no visible defects (items 1-4) are found, a couple of test images should be taken. Generally, a well-illuminated typical indoor scene can be used as a target. The main considerations are:

- The protection window has to be clean.
- The amount of light (300 – 600 lux (bright office lighting)) is sufficient.
- The scene should contain, for example, small objects for checking sharpness. Their distance should be 1 – 2 meters.
- If possible, compare the image to another image of the same scene, taken with a different device. Note that the reference device has to be a similar Nokia phone.

Steps

1. Take several images of small objects in the distance of 1-2 metres.
2. Analyse the images on a PC screen at 100% scaling with the reference images.

   Pay attention to the computer display settings: at least 65000 colors (16-bit) have to be used. True colour (24-bit, 16 million colours) or 32-bit (full colour) setting is recommended.

Next action

If there appears to be a clearly noticeable difference between the reference image and the test images, the module might have a misfocused lens -> change the module.

Re-check the resolution after changing the camera module.

If the changed module produces the same result, the fault is probably in the camera window. Check the window by looking carefully through it when replacing the module.

Dirty camera lens protection window

The following series of images demonstrates the effects of fingerprints on the camera protection window.

It should be noted that the effects of any dirt in images can vary much. It may be difficult to judge whether the window has been dirty or if something else is wrong. Therefore, the cleanness of the protection window should always be checked and the window should be wiped clean with a suitable cloth.

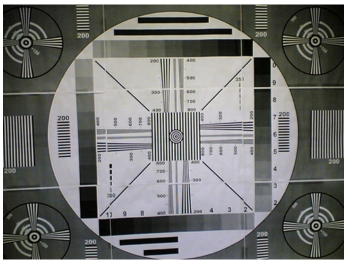


Figure 64 Image taken with clean protection window

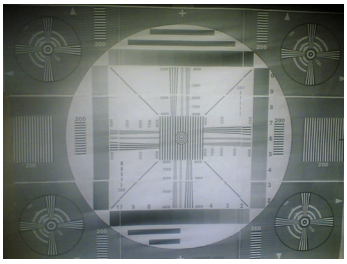


Figure 65 Image taken with greasy protection window

Image bit errors

Bit errors are image defects caused by data transmission errors between the camera module and the phone baseband and/or errors inside the module.

Usually bit errors can be easily detected in images, and they are best visible in full resolution images. A good practice is to use a uniform white test target when analysing these errors. The errors are clearly visible, colourful sharp dots or lines in camera images. See the following figure.

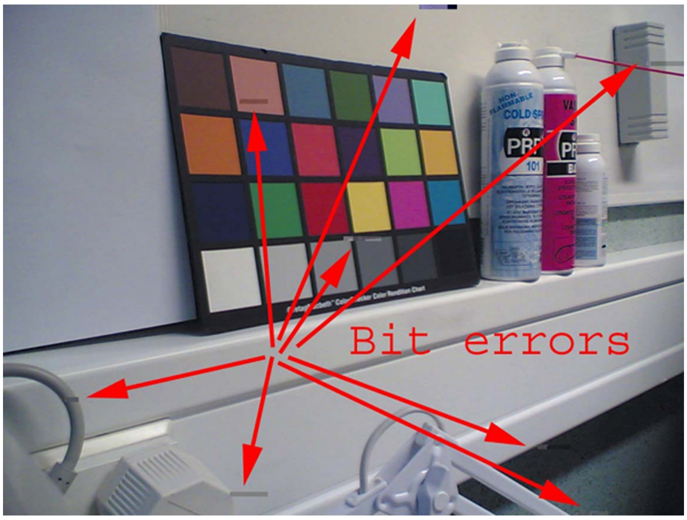


Figure 66 Bit errors caused by JPEG compression

One type of bit error is a lack of bit depth. In this case, the image is almost totally black under normal conditions, and only senses something in very highly illuminated environments. Typically this is a contact problem between the camera module and the phone main PWB. Very black images and viewfinder may also be caused by failure of the 2.8V supply to the camera. You should check the camera assembly and connector contacts.

If the fault is in the camera module, bit errors are typically visible only when using some specific image resolution. For example, in case of a viewfinder fault, the error might exist but is not visible in a full size image.

Camera troubleshooting flowcharts

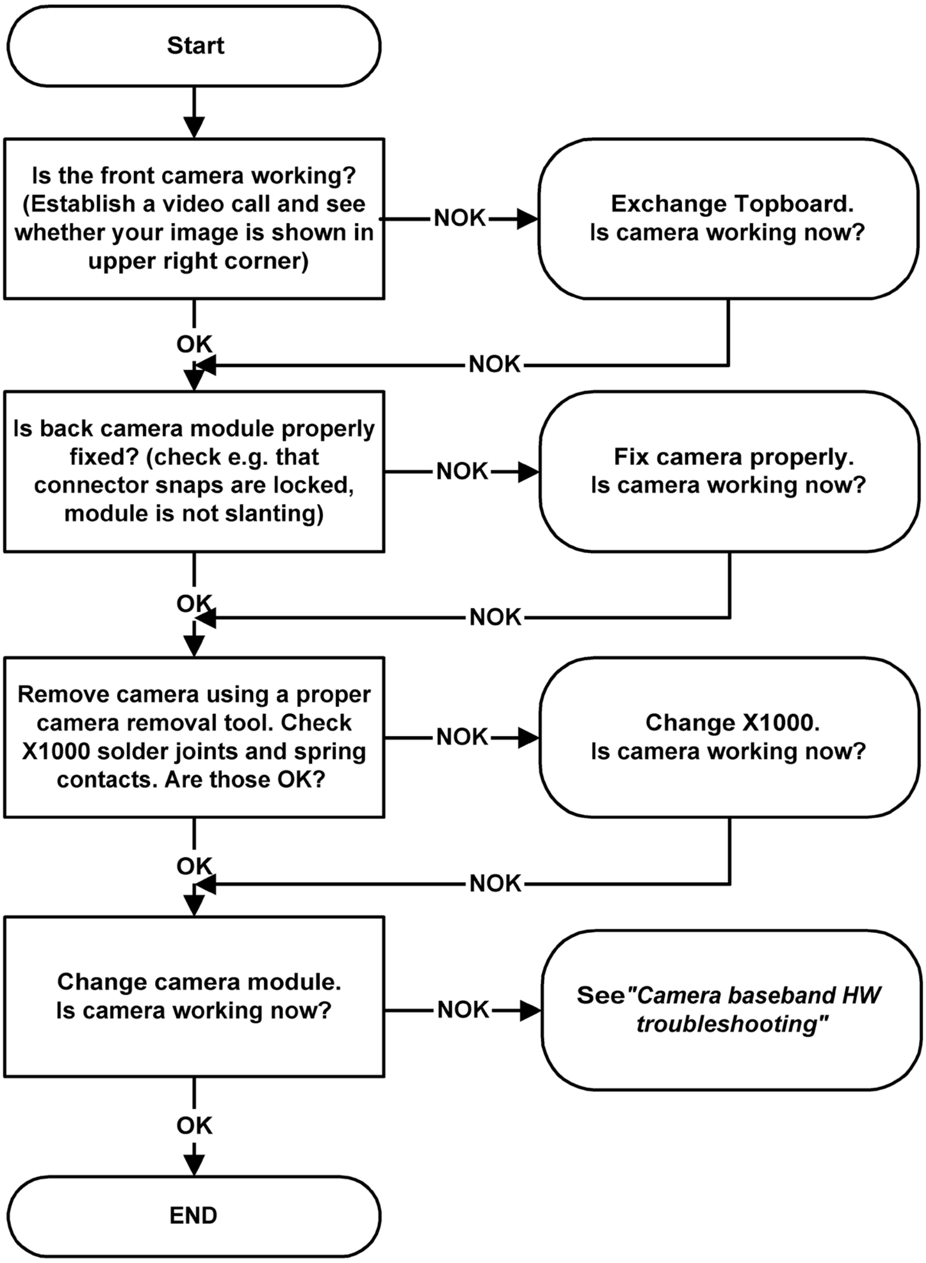
Back camera troubleshooting

Camera hardware failure message troubleshooting

Context

If you get a hardware failure message when using the camera, follow the next troubleshooting flowchart.

Troubleshooting flow

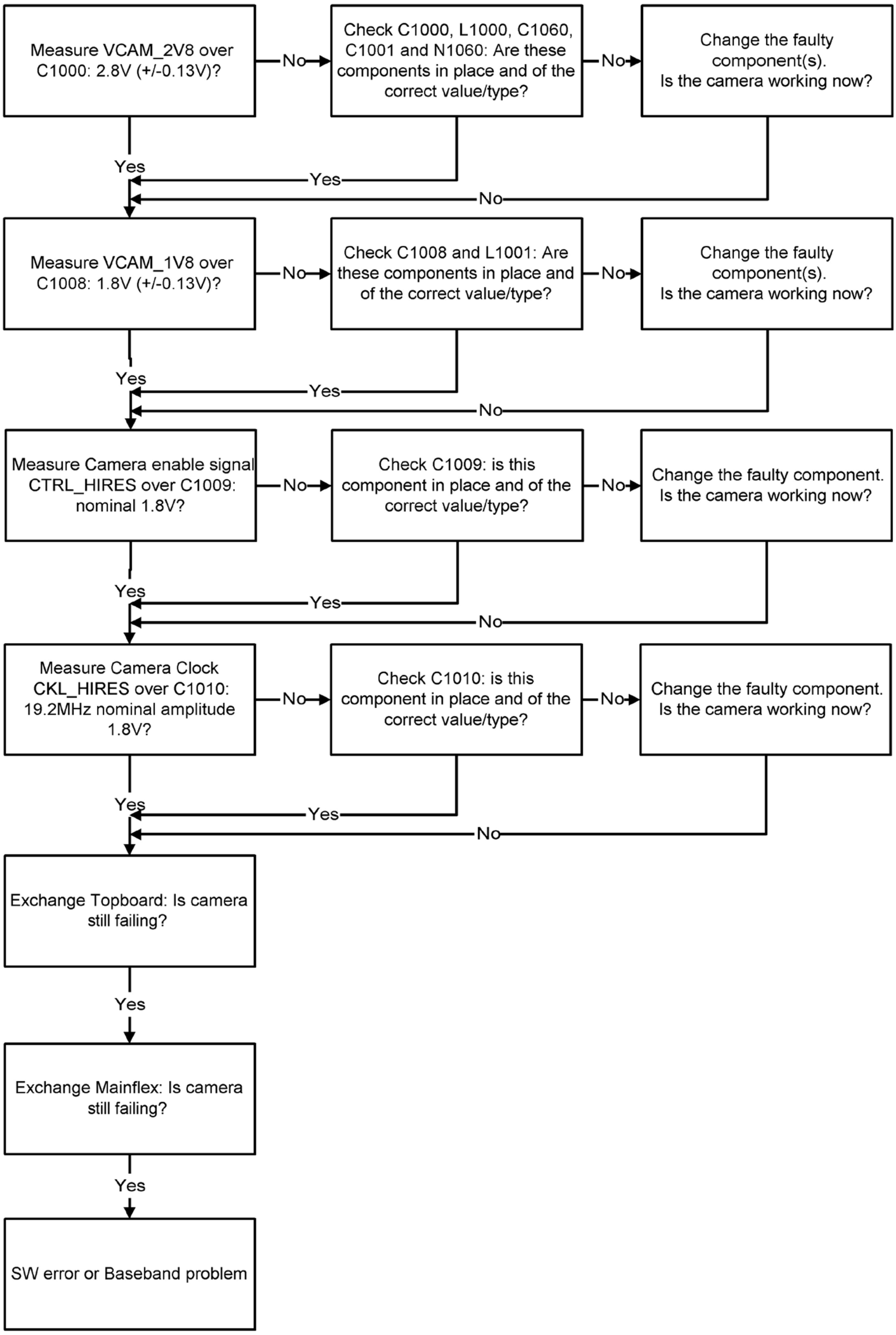

Start
Is the front camera working? (Establish a video call and see whether your image is shown in upper right corner)
NOK
Exchange Topboard. Is camera working now?
OK
NOK
Is back camera module properly fixed? (check e.g. that connector snaps are locked, module is not slanting)
NOK
Fix camera properly. Is camera working now?
OK
NOK
Remove camera using a proper camera removal tool. Check X1000 solder joints and spring contacts. Are those OK?
NOK
Change X1000. Is camera working now?
OK
NOK
Change camera module. Is camera working now?
NOK
See "Camera baseband HW troubleshooting"
OK
END

Note: Make sure that the phone has the latest software before continuing.

Camera baseband HW troubleshooting

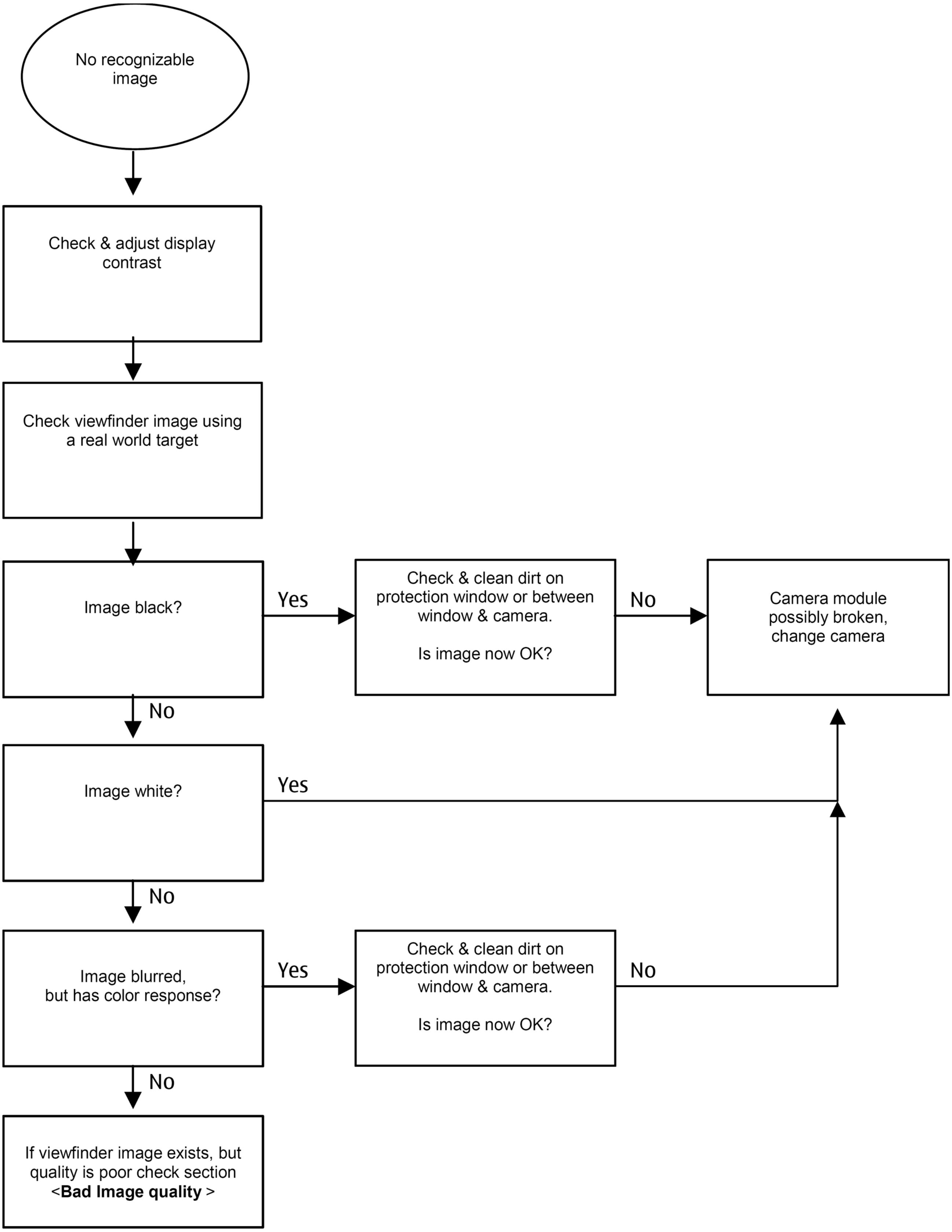
Troubleshooting flow

Note: the camera application must be activated for any camera signals including voltages to be present


Measure VCAM_2V8 over C1000: 2.8V (+/-0.13V)?
No
Check C1000, L1000, C1060, C1001 and N1060: Are these components in place and of the correct value/type?
No
Change the faulty component(s). Is the camera working now?
Yes
Yes
No
Measure VCAM_1V8 over C1008: 1.8V (+/-0.13V)?
No
Check C1008 and L1001: Are these components in place and of the correct value/type?
No
Change the faulty component(s). Is the camera working now?
Yes
Yes
No
Measure Camera enable signal CTRL_HIRES over C1009: nominal 1.8V?
No
Check C1009: is this component in place and of the correct value/type?
No
Change the faulty component. Is the camera working now?
Yes
Yes
No
Measure Camera Clock CKL_HIRES over C1010: 19.2MHz nominal amplitude 1.8V?
No
Check C1010: is this component in place and of the correct value/type?
No
Change the faulty component. Is the camera working now?
Yes
Yes
No
Exchange Topboard: Is camera still failing?
Yes
Exchange Mainflex: Is camera still failing?
Yes
SW error or Baseband problem

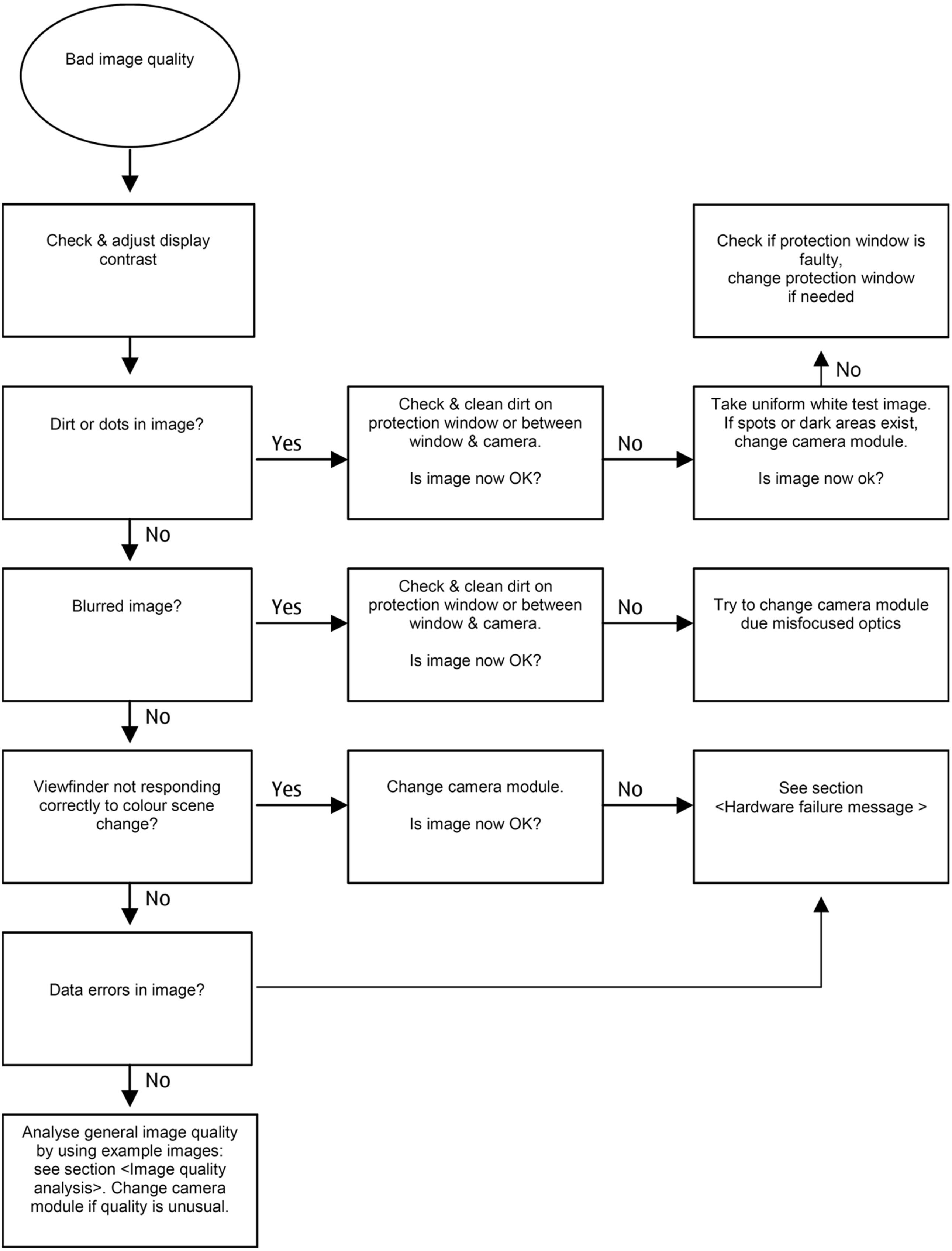
Camera viewfinder troubleshooting

Troubleshooting flow


No recognizable image
Check & adjust display contrast
Check viewfinder image using a real world target
Image black?
Yes
Check & clean dirt on protection window or between window & camera.
Is image now OK?
No
Camera module possibly broken, change camera
No
Image white?
Yes
No
Image blurred, but has color response?
Yes
Check & clean dirt on protection window or between window & camera.
Is image now OK?
No
No
If viewfinder image exists, but quality is poor check section <Bad Image quality >

Bad camera image quality troubleshooting

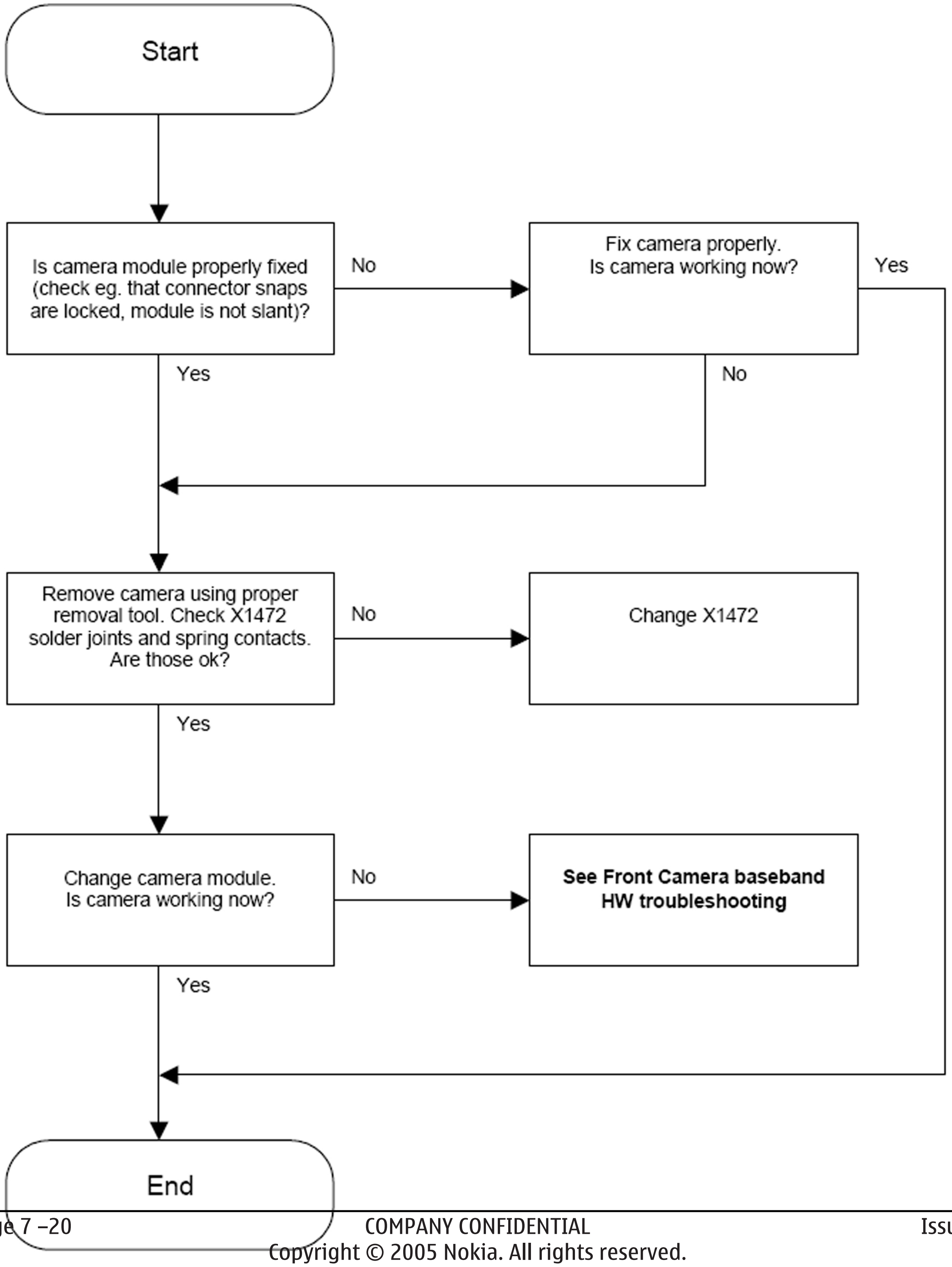
Troubleshooting flow


Bad image quality
Check & adjust display contrast
Dirt or dots in image?
Yes
Check & clean dirt on protection window or between window & camera.
Is image now OK?
No
Take uniform white test image. If spots or dark areas exist, change camera module.
Is image now ok?
No
Check if protection window is faulty, change protection window if needed
No
Blurred image?
Yes
Check & clean dirt on protection window or between window & camera.
Is image now OK?
No
Try to change camera module due misfocused optics
No
Viewfinder not responding correctly to colour scene change?
Yes
Change camera module.
Is image now OK?
No
See section <Hardware failure message >
No
Data errors in image?
No
Analyse general image quality by using example images: see section <Image quality analysis>. Change camera module if quality is unusual.

Front camera troubleshooting

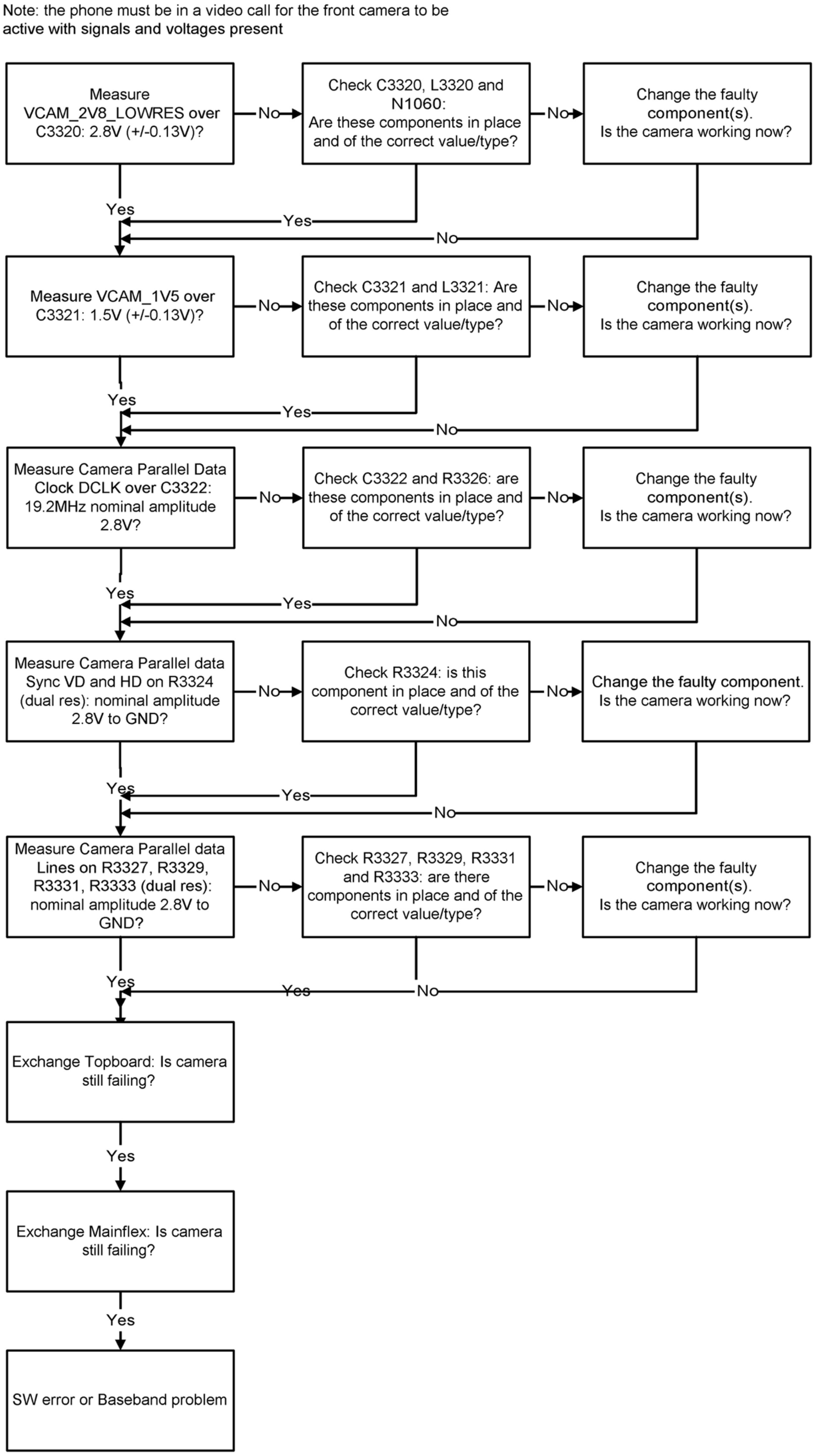
Front camera hardware failure message troubleshooting

Troubleshooting flow

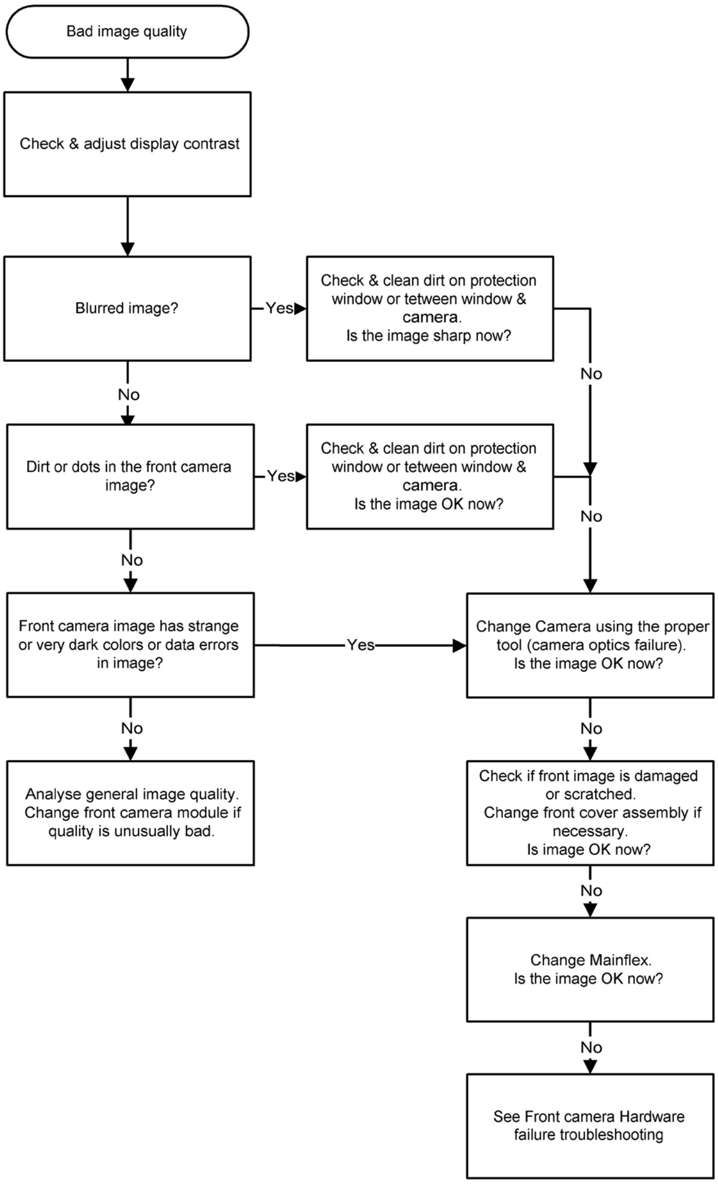

Start
Is camera module properly fixed (check eg. that connector snaps are locked, module is not slant)?
No
Fix camera properly. Is camera working now?
Yes
Yes
No
Remove camera using proper removal tool. Check X1472 solder joints and spring contacts. Are those ok?
No
Change X1472
Yes
Change camera module. Is camera working now?
No
See Front Camera baseband HW troubleshooting
Yes
End

Front camera HW baseband troubleshooting

Troubleshooting flow


Note: the phone must be in a video call for the front camera to be active with signals and voltages present
Measure VCAM_2V8_LOWRES over C3320: 2.8V (+/-0.13V)?
No
Check C3320, L3320 and N1060: Are these components in place and of the correct value/type?
No
Change the faulty component(s). Is the camera working now?
Yes
Yes
No
Measure VCAM_1V5 over C3321: 1.5V (+/-0.13V)?
No
Check C3321 and L3321: Are these components in place and of the correct value/type?
No
Change the faulty component(s). Is the camera working now?
Yes
Yes
No
Measure Camera Parallel Data Clock DCLK over C3322: 19.2MHz nominal amplitude 2.8V?
No
Check C3322 and R3326: are these components in place and of the correct value/type?
No
Change the faulty component(s). Is the camera working now?
Yes
Yes
No
Measure Camera Parallel data Sync VD and HD on R3324 (dual res): nominal amplitude 2.8V to GND?
No
Check R3324: is this component in place and of the correct value/type?
No
Change the faulty component. Is the camera working now?
Yes
Yes
No
Measure Camera Parallel data Lines on R3327, R3329, R3331, R3333 (dual res): nominal amplitude 2.8V to GND?
No
Check R3327, R3329, R3331 and R3333: are there components in place and of the correct value/type?
No
Change the faulty component(s). Is the camera working now?
Yes
Yes
No
Exchange Topboard: Is camera still failing?
Yes
Exchange Mainflex: Is camera still failing?
Yes
SW error or Baseband problem

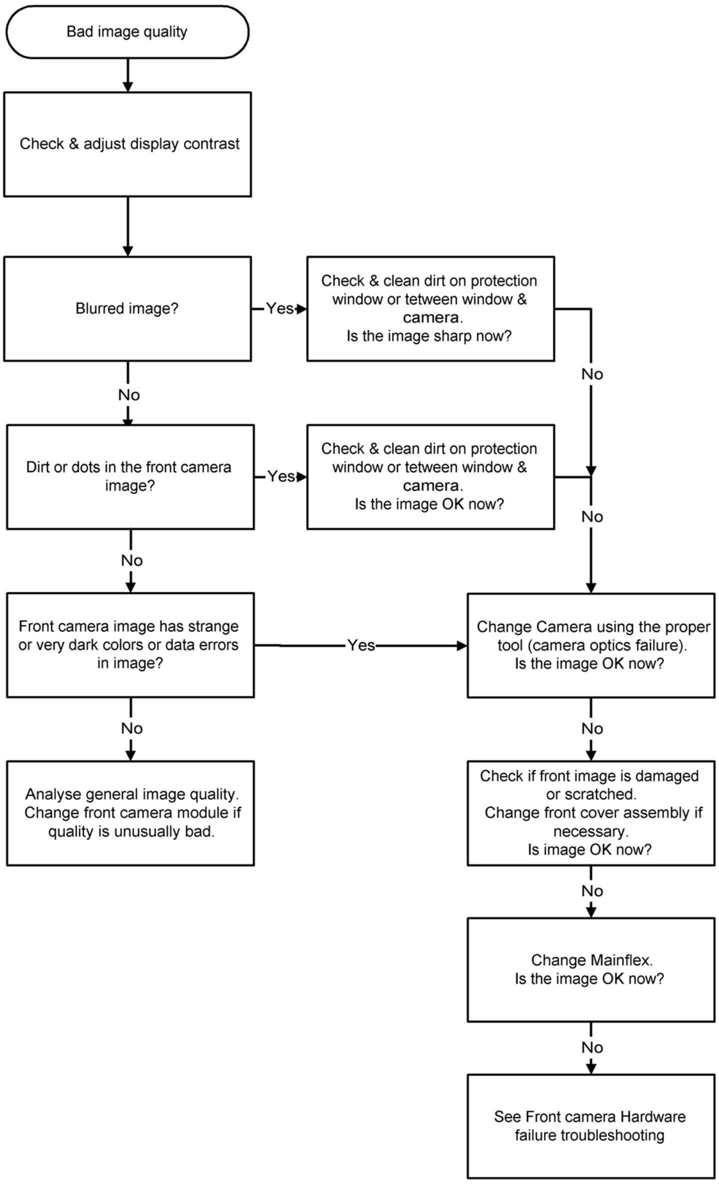
Note: the phone must be in a video call for the front camera to be active.
The front camera image is the small one in the upper right corner


Bad image quality
Check & adjust display contrast
Blurred image?
Yes
Check & clean dirt on protection window or tetween window & camera.
Is the image sharp now?
No
No
Dirt or dots in the front camera image?
Yes
Check & clean dirt on protection window or tetween window & camera.
Is the image OK now?
No
No
Front camera image has strange or very dark colors or data errors in image?
Yes
Change Camera using the proper tool (camera optics failure).
Is the image OK now?
No
No
Analyse general image quality.
Change front camera module if quality is unusually bad.
Check if front image is damaged or scratched.
Change front cover assembly if necessary.
Is image OK now?
No
Change Mainflex.
Is the image OK now?
No
See Front camera Hardware failure troubleshooting

Front camera bad image quality troubleshooting

Troubleshooting flow

Note: the phone must be in a video call for the front camera to be active.
The front camera image is the small one in the upper right corner


Bad image quality
Check & adjust display contrast
Blurred image?
Yes
Check & clean dirt on protection window or tetween window & camera. Is the image sharp now?
No
No
Dirt or dots in the front camera image?
Yes
Check & clean dirt on protection window or tetween window & camera. Is the image OK now?
No
No
Front camera image has strange or very dark colors or data errors in image?
Yes
Change Camera using the proper tool (camera optics failure). Is the image OK now?
No
No
Analyse general image quality. Change front camera module if quality is unusually bad.
Check if front image is damaged or scratched. Change front cover assembly if necessary. Is image OK now?
No
Change Mainflex. Is the image OK now?
No
See Front camera Hardware failure troubleshooting

■ Flash LED troubleshooting

Introduction to flash LED troubleshooting

A fault or complaint associated to LED flash operation can be roughly categorized into two subgroups:

1 Flash is not functional at all (no light output at all).

2 Images can be taken and they are recognizable but for some reason the quality of images is degraded.

The quality of an image is very difficult to measure quantitatively, and even comparative measurements are difficult (comparing two images), if the difference between reference images is small. If a user is not satisfied with his/her device's image quality, it is fairly difficult to accurately test the device and get an exact result, which would tell if the device is working properly.

Often subjective evaluation has to be used for finding out if there is something wrong in the flash. Some training or experience of a correctly operating reference device may be needed in order to detect possible faults. It is easy for a user to take low quality images in bad conditions. Therefore, the camera and flash operation has to be always checked in constant conditions (lighting, temperature) or by using a second, known-to-be good reference device.

Flash LED and image taking conditions

This section describes some of common factors, which may cause poor image quality if not taken into account by end users when taking pictures, and may therefore result in complaints. The items described are normal to the camera and LED flash operation and do not raise a need for servicing the components.

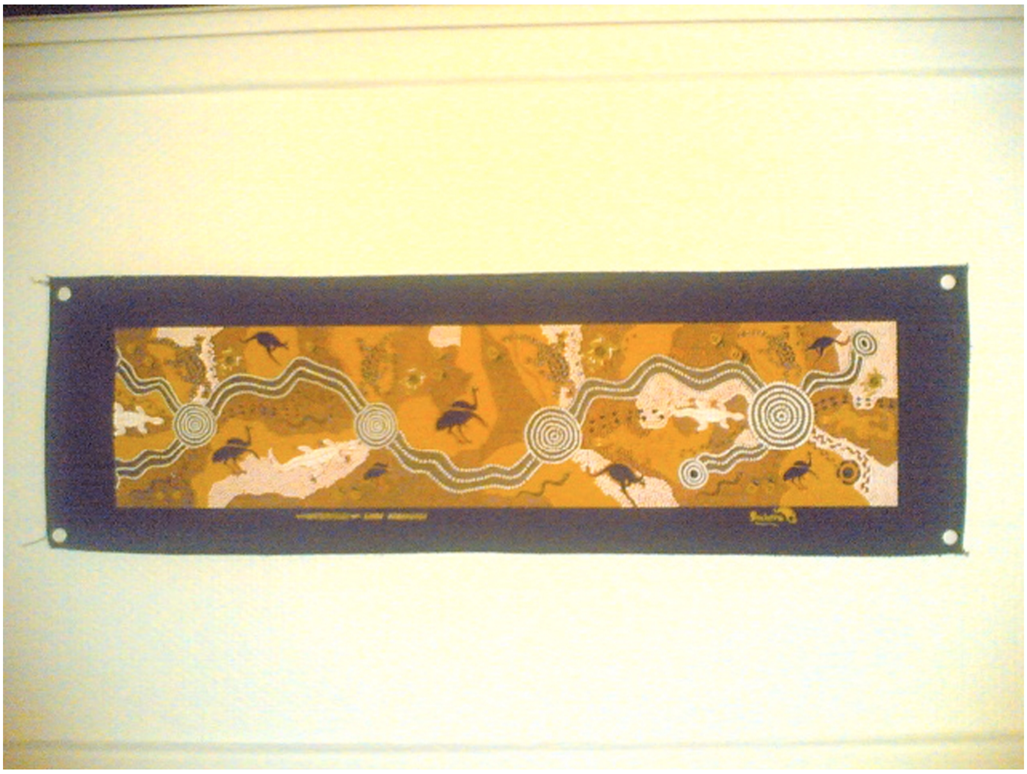


Figure 67 Example of a good quality image taken with the flash LED

Distance to the target (too close)

There is no feedback in the flash system, which means that the light output is constant in every situation. This causes the images to overexposure, when shot from close distance. The flash LED is designed to work optimally between distances of 50cm – 1.20m.

This is normal behaviour; do not change the flash module.

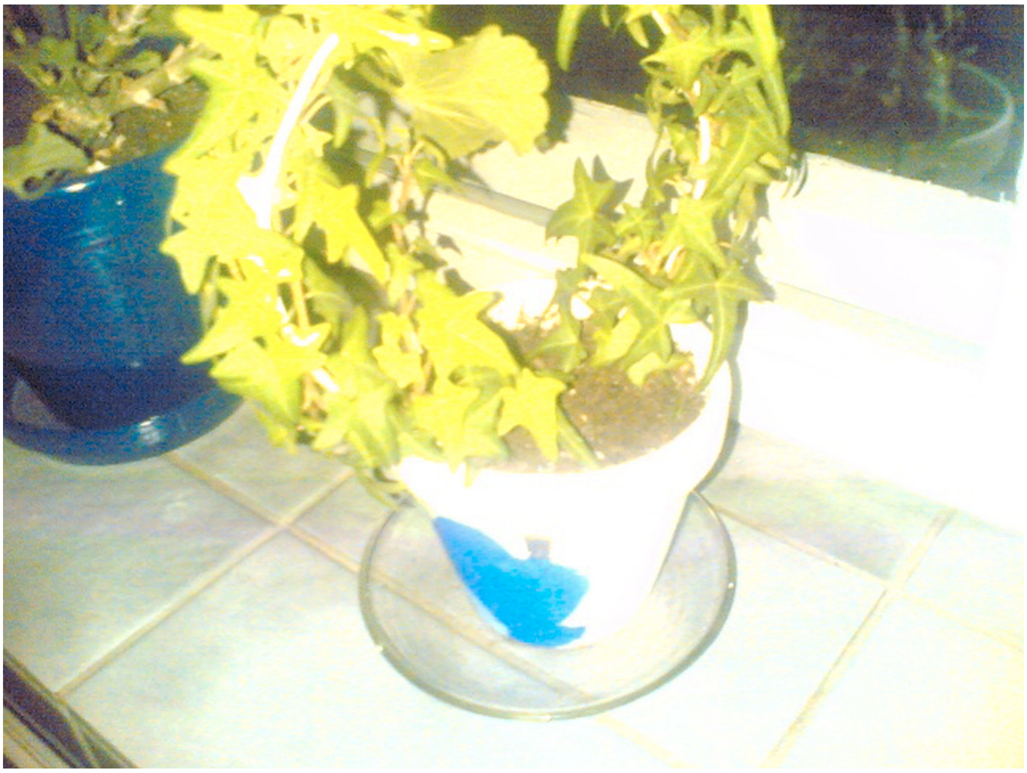


Figure 68 overexposed image

Distance to the target (too far away):

The power of the white LED flash is still very modest compared to xenon flash technology. Even with the full power, the maximum distance for an acceptable image quality is roughly 1.2m. If the distance is greater than 1.2m, the images will appear dark and the noise level increases.

This is normal behaviour; do not change the flash module.

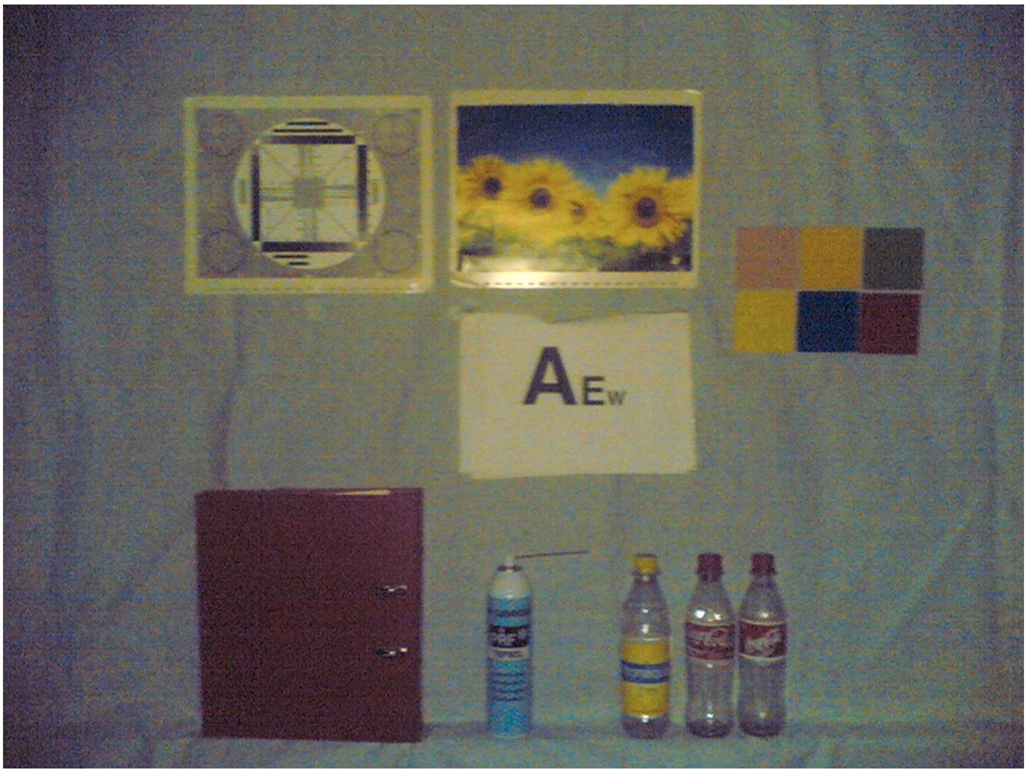


Figure 69 Dark and noisy image

Shaken (= blurred) images

The traditional xenon flash has the advantage of stopping the movement. This is a result of an extremely short and intense light pulse, which makes it possible for a camera to use very short exposure time. Due to the weak output of the LED flash, the exposure time has to be actually increased in the viewfinder mode in total blackness, instead of shortening it. This allows the sensor to integrate longer and collect more light but this also easily creates blurred images if care is not taken.

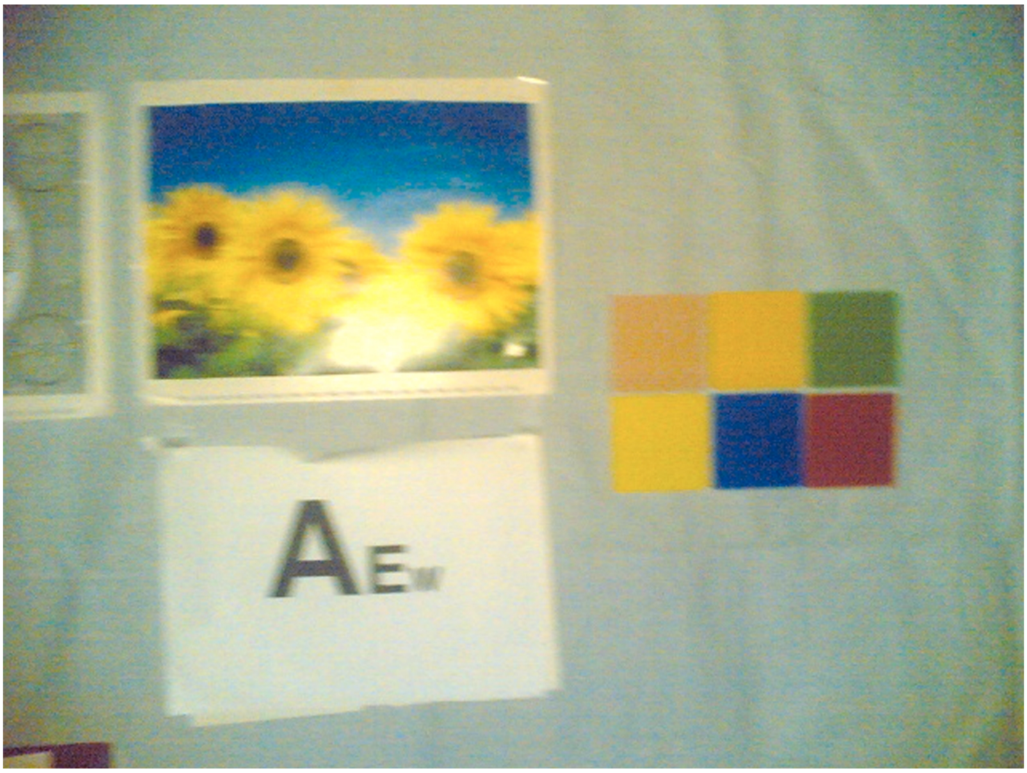


Figure 70 Shaken image

Camera white balance failure and overexposure due to presence of ambient light

Because the spectral output of the flash is known, the white balance and the exposure control of the camera work in optimal way with the flash in total blackness. This is why some of the pictures may fail, if there is some ambient light present when the image is taken.

If the flash works correctly in dark conditions, there is no need to change the flash module.

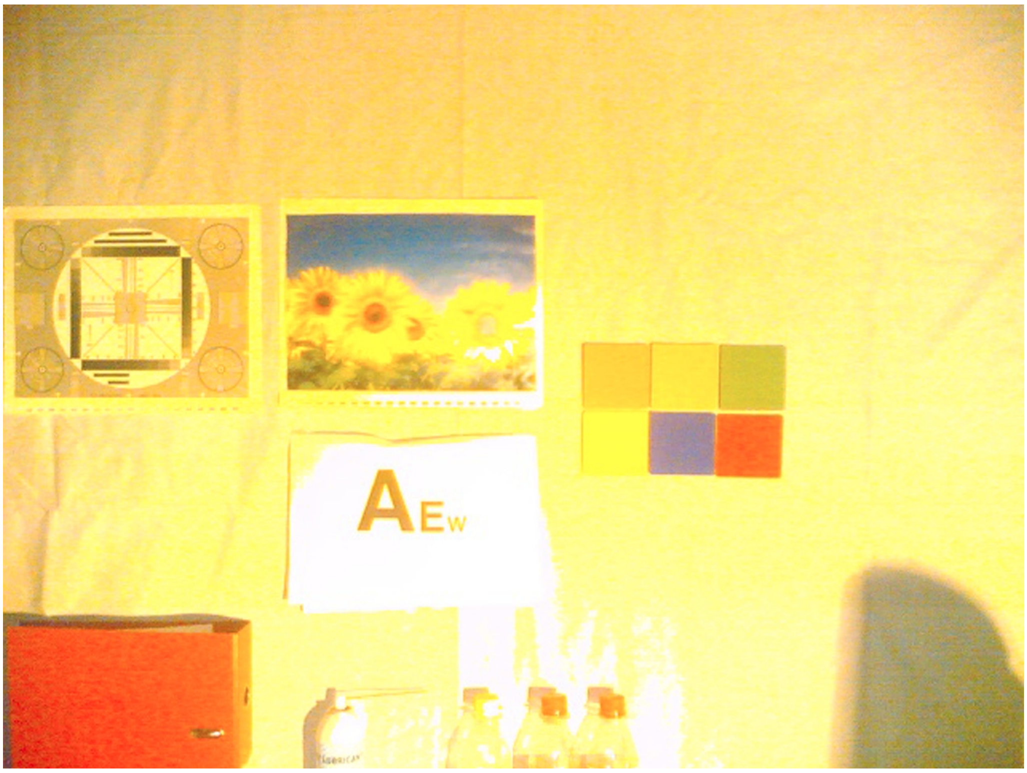


Figure 71 Camera white balance failure and overexposure

Colour difference between different modules

There is some variation in the spectrum of the flash, which derives from the manufacturing process of the white LEDs. Because of this variation, there may be some variation in the colour of the images as well.

This is normal behaviour; do not change the flash module.

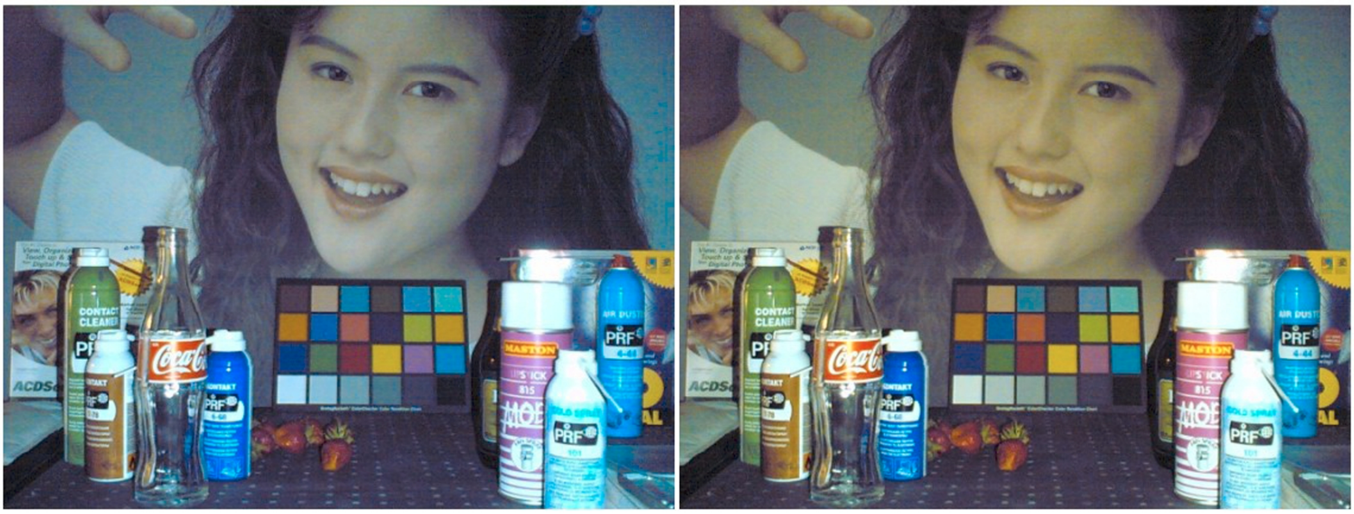


Figure 72 Color difference between flash colour limit samples

Analysing image quality

Possible faults in image quality

When checking for possible errors in the flash functionality, knowing what error is suspected, significantly helps the testing by narrowing down the number of possible test cases. The following types of image quality problems may be expected to appear:

- LED module is not flashing at all
- Image colours are not good
- Flash power is weak

Testing flash module functionality

Context

With the help of this test you can check the flash module's overall functionality.

Always enable the flash using the "Options" menu before performing the test.

Steps

1. Take an image with the flash and monitor at same time whether the LED module flashes.

Results

If the LED flashes normally, the overall functionality of the module is OK.

Testing image colours with flash

Context

With the help of this test you can check if the image colours are normal when using the flash.

Steps

1. Take an image of a target, which contains something white in total blackness from less than 1 m range.

Results

If the white target appears to be white, the flash is working correctly. However, remember that there is some variation in the flash colour from module to module.

Testing flash power

Context

With the help of this test you can check if the flash is working with adequate power level.

Steps

1. Take an image with the flash in total blackness (ambient light <1 lux) of a target 80 cm - 1 cm away.

Results

If the flash is working normally with adequate power level, the image is correctly exposed from 80cm – 1m distances.

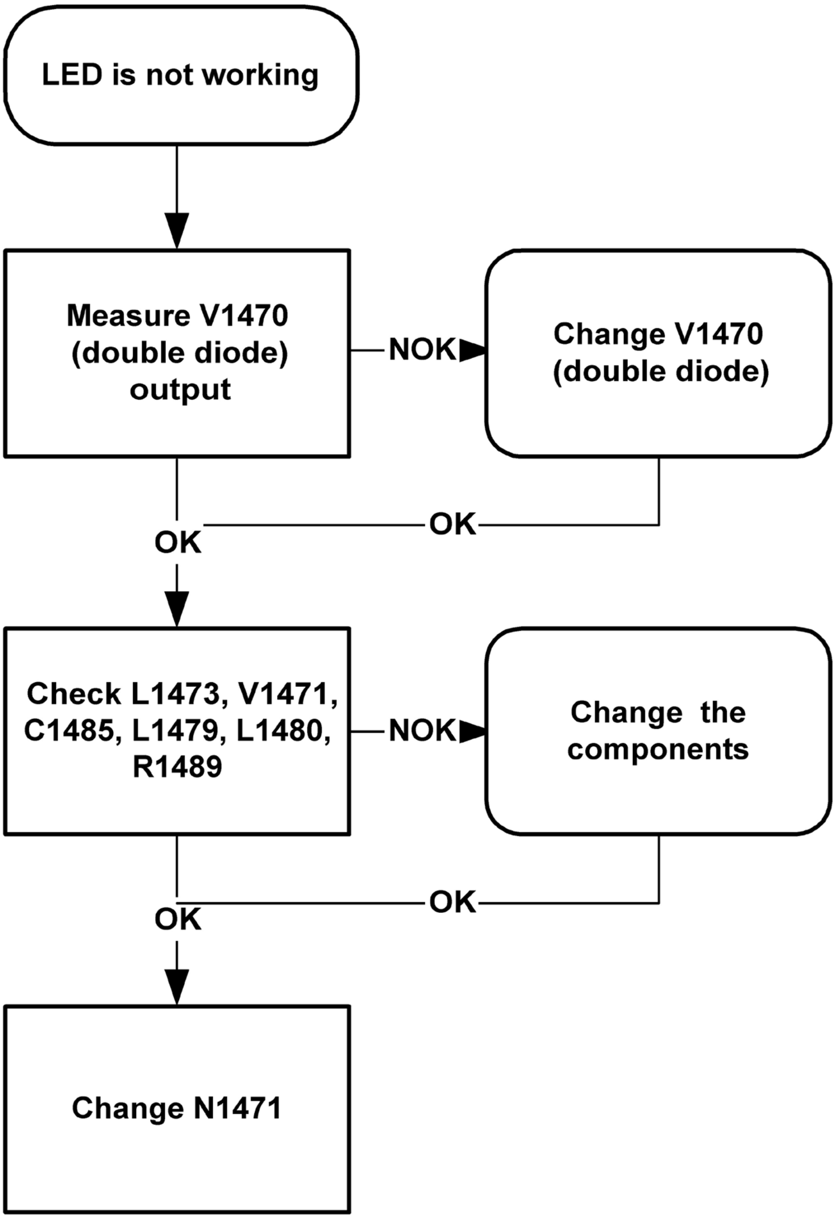
Remember that the brightness level in the corners is always less than in the center of the image because of camera and flash optics.

Flash LED troubleshooting flowcharts

Flash LED HW baseband troubleshooting

Troubleshooting flow

If there are problems in the flash LED driver circuit, the testing procedure is complicated, because the driver circuit output cannot be reliably measured without the load (LED). Load (LED) is always disconnected from the output when the phone is disassembled.


LED is not working
Measure V1470 (double diode) output
NOK
Change V1470 (double diode)
OK
OK
Check L1473, V1471, C1485, L1479, L1480, R1489
NOK
Change the components
OK
OK
Change N1471

8 — RF troubleshooting

(This page left intentionally blank.)

Table of Contents

General RF troubleshooting........8–5
 General RF troubleshooting........8–5
Auto tuning........8–5
GSM Receivers........8–6
 GSM RX Troubleshooting........8–6
GSM Transmitters........8–8
 GSM900/1800/1900 TX Troubleshooting........8–8
WCDMA Receiver........8–9
 WCDMA RX Troubleshooting........8–9
WCDMA Transmitter........8–11
 WCDMA TX Troubleshooting........8–11
Synthesizer troubleshooting 8–12
 PIHI (N7500) Troubleshooting........8–12
 Synthesizer Troubleshooting........8–13
Bluetooth and FM radio........8–15
 Bluetooth troubleshooting........8–15
 FM radio troubleshooting........8–16

List of Figures

Figure 73 Auto tuning concept with CMU200........8–6
Figure 74 Auto tuning concept with RX and TX tuning devices and splitter........8–6
Figure 75 GSM900/1800/1900 RX test points........8–8
Figure 76 GSM900/1800/1900 TX test points........8–9
Figure 77 WCDMA RX test points........8–11
Figure 78 WCDMA TX test points........8–12
Figure 79 PIHI (N7500) test points........8–13
Figure 80 Synthesizer test points........8–14
Figure 81 Troubleshooting diagram: Bluetooth........8–15
Figure 82 Troubleshooting diagram: FM radio........8–16

(This page left intentionally blank.)

General RF troubleshooting

General RF troubleshooting

Most RF semiconductors are static discharge sensitive

Two types of measurements are used in the following. It will be specified if the measurement type is "RF" or "LF".

- RF measurements are done with a Spectrum Analyzer and a high-frequency 500 ohm passive probe, for example HP54006A. (Note that when measuring with the 500 ohm probe the signal will be around 20 dB attenuated. The values in the following will have these 20 dB subtracted and represent the real value seen on the spectrum analyzer). Note that the testing have some losses which must be taken into consideration when calibrating the test system.
- LF (Low frequency) and DC measurements should be done with a 10:1 probe and an oscilloscope. The probe used in the following is 10 Mohm/8pF passive probe. If using another probe then bear in mind that the voltages displayed may be slightly different. Always make sure the measurement set-up is calibrated when measuring RF parameters on the antenna pad. Remember to include the loss in the module repair jig when realigning the phone.

So ESD protection must be applied during repair (ground straps and ESD soldering irons). RF IC N7600 and FEM are moisture sensitive so parts must be pre-baked prior to soldering. Apart from key-components described in this document there are a lot of discrete components (resistors, inductors and capacitors) for which troubleshooting is done by checking if soldering of the component is done properly and checking if the component is missing from PWB. Capacitors can be checked for short-circuiting and resistors for value by means of an ohmmeter, but be aware in-circuit measurements should be evaluated carefully. In the following both the name EGSM and GSM 900 will be used for the lower band and both PCN and GSM 1800 will be used for the upper band.

Auto tuning

This phone can be tuned automatically.

Autotune is designed to align the phone's RF part easier and faster. It performs calibrations, tunings and measurements of RX and TX. The results are displayed and logged in a result file, if initiated.

Hardware set up

Hardware requirements for auto tuning:

- PC (Windows 2000/NT) with GPIB card
- Power supply
- Product specific module jig
- Cables: 3 (alt.1) RF cable, 1 GPIB cable and DAU-9S
- Signal analyser (TX), signal generator (RX) and RF-splitter *or* one device including all.

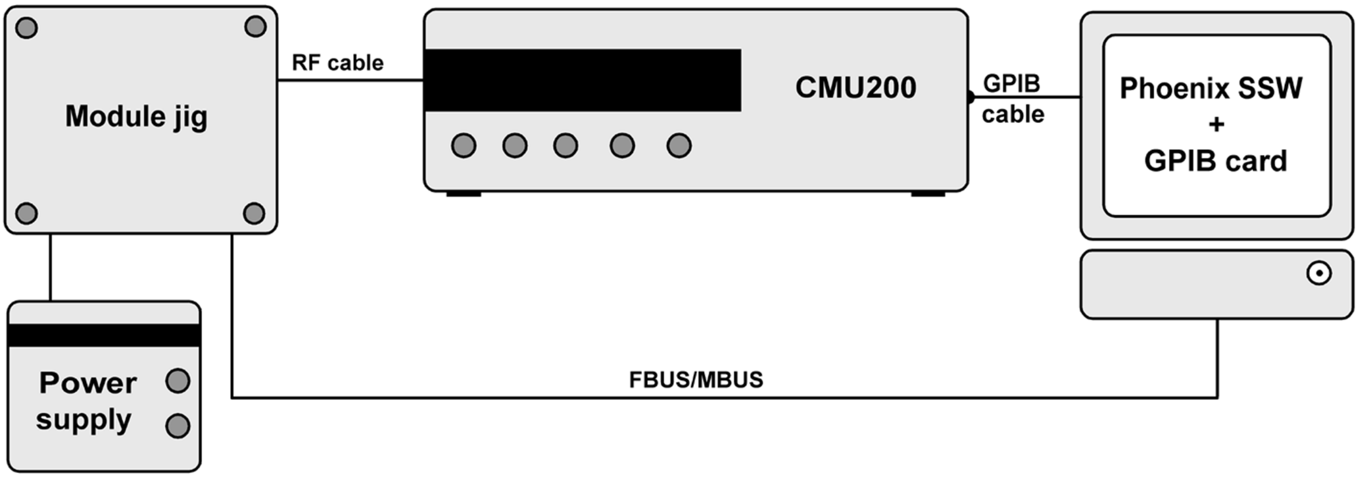

Module jig
RF cable
CMU200
GPIB cable
Phoenix SSW + GPIB card
Power supply
FBUS/MBUS

Figure 73 Auto tuning concept with CMU200

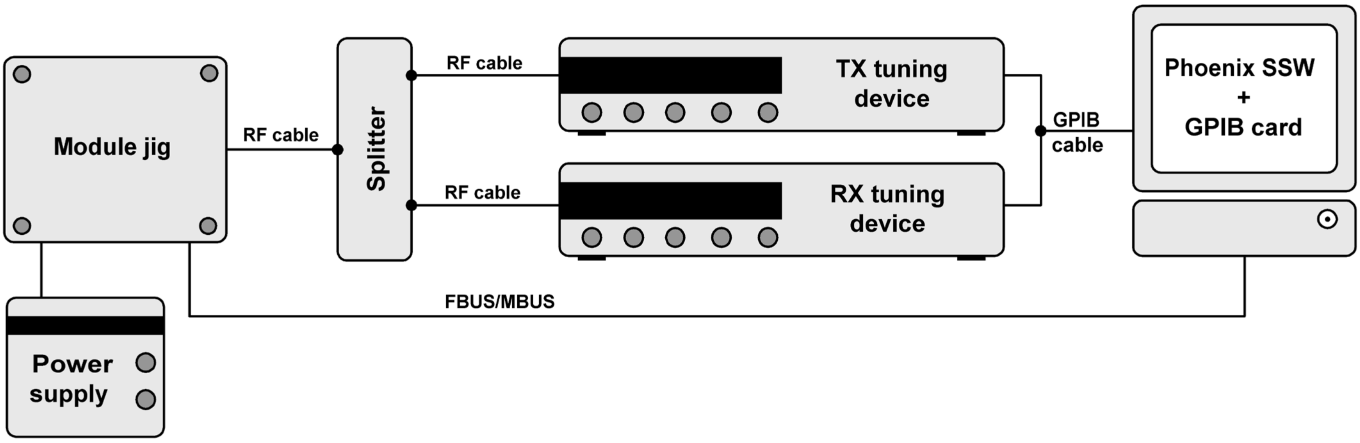

Module jig
RF cable
Splitter
RF cable
TX tuning device
RF cable
RX tuning device
GPIB cable
Phoenix SSW + GPIB card
Power supply
FBUS/MBUS

Figure 74 Auto tuning concept with RX and TX tuning devices and splitter

Phoenix preparations

Copy the two phone specific ini-files, for example *rm_13_tunings.ini* and *autotune_RM-13.ini,* to a phone specific folder, for example *|Phoenix|products|RM-13|*.

Auto tuning procedure

1. Make sure the phone (in the jig) is connected to the equipment. Else, some menus will not be shown in Phoenix.
2. The first time you are using automatic tuning on this phone model, on this computer, you will have to *Set loss* for cables and jigs.
3. To go to autotune, select *Tuning (Alt-U)* > *Auto-Tune (Alt-A)* from the menu.
4. If you need more assistance, please refer to the Phoenix *Help*.

GSM Receivers

GSM RX Troubleshooting

Preparations

Make the following settings:

Setting	GSM900	GSM1800	GSM1900
Phoenix RF Control	Continues RX and AGC gain step 14		
Phoenix channel	37	955	661
Signal generator to antenna connector	942.4677MHz (67.71kHz offset) at -60dBm	1842.846771MHz (67.71kHz offset) at -60dBm	1960.046771MHz (67.71kHz offset) at -60dBm
Spectrum analyzer	RBW=500kHz, VBW=500kHz, span=20kHz		
Centre frequency	942MHz	1840MHz	1960MHz

Check the following

Check the levels in the steps below.

NO.	Signal Name	Test point	GSM900	GSM1800	GSM1900
1	RXIP (out)	J7515	124mVpp, 730mVDC	106mVpp, 760mVDC	100mVpp, 780mVDC
2	RXQP (OUT)	J7516	124mVpp, 730mVDC	106mVpp, 690mVDC	100mVpp, 690mVDC
3	VC1_TXFEM	J7530	0V	0V	0V
4	VC2_TXFEM	J7531	0V	2.7VDC	2.7VDC
5	VC3_TXFEM	J7532	0V	0V	2.7VDC
6A*	IN_1800	C7515	-	-54dBm (RF level -30dBm)	-
6B*	IN_1900	C7514	-	-	-47dBm (RF level -30dBm)

*= Note settings in the table above

1. Measure RXIP *1*
   and RXQP *2.*
2. Measure front end module control signal voltages *3, 4 and 5.*

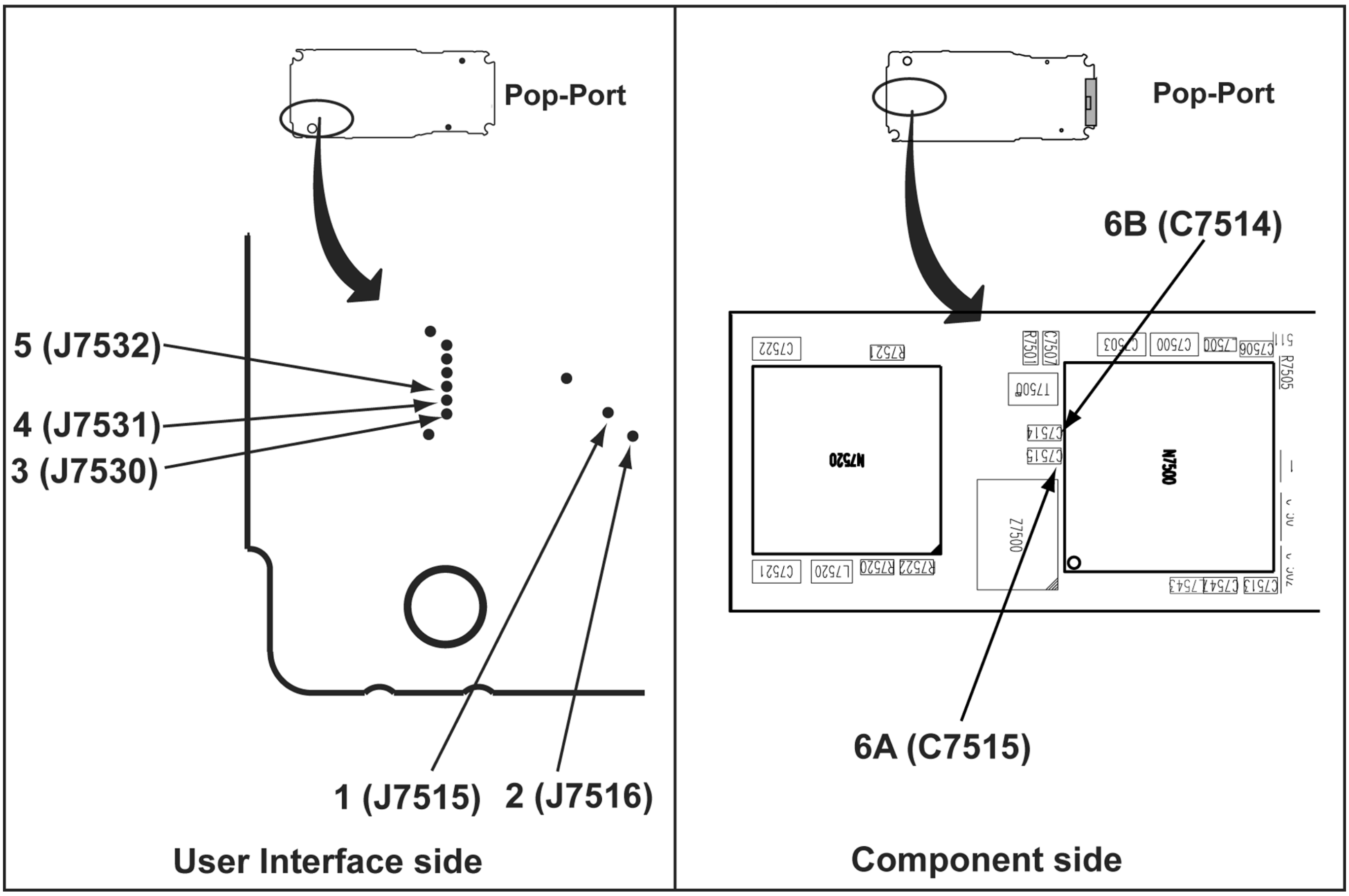

Pop-Port
5 (J7532)
4 (J7531)
3 (J7530)
1 (J7515)
2 (J7516)
User Interface side
Pop-Port
6B (C7514)
N7520
N7500
Z7500
6A (C7515)
Component side

Figure 75 GSM900/1800/1900 RX test points

GSM Transmitters

GSM900/1800/1900 TX Troubleshooting

Preparations

Make the following settings:

Setting	GSM900	GSM1800	GSM1900
Phoenix RF Control Phoenix Tx Power level	Operational mode = Burst Tx data type = Random		
	10	5	5

Check the following

Check the voltages in the steps below.

NO.	Signal Name	Test point	GSM900	GSM1800	GSM1900
1	V_Det_GSM	J7533	730mVDC	660mVDC	690mVDC
2	PA_supply-VBAT	C7521	3.8VDC	3.8VDC	3.8VDC
3	RF level-ANT_GSM	Conn.	23.2dBm	20dBm	20.3dBm
4	Sw cont-VC1_TXFEM	J7530	2.75VDC	2.75VDC	2.75VDC

NO.	Signal Name	Test point	GSM900	GSM1800	GSM1900
5	Sw con-VC2_TXFEM	J7531	0V	2.75VDC	2.75VDC
6	Sw con-VC3_TXFEM	J7532	2.75VDC	2.75VDC	2.75VDC
7A	Tx-1	R7522	397.4MHz/-28.7 dBm	-	-
7B	Tx-2	R7521	-	1747.8MHz/-24.6dBm	1880MHz/-25.0 dBm

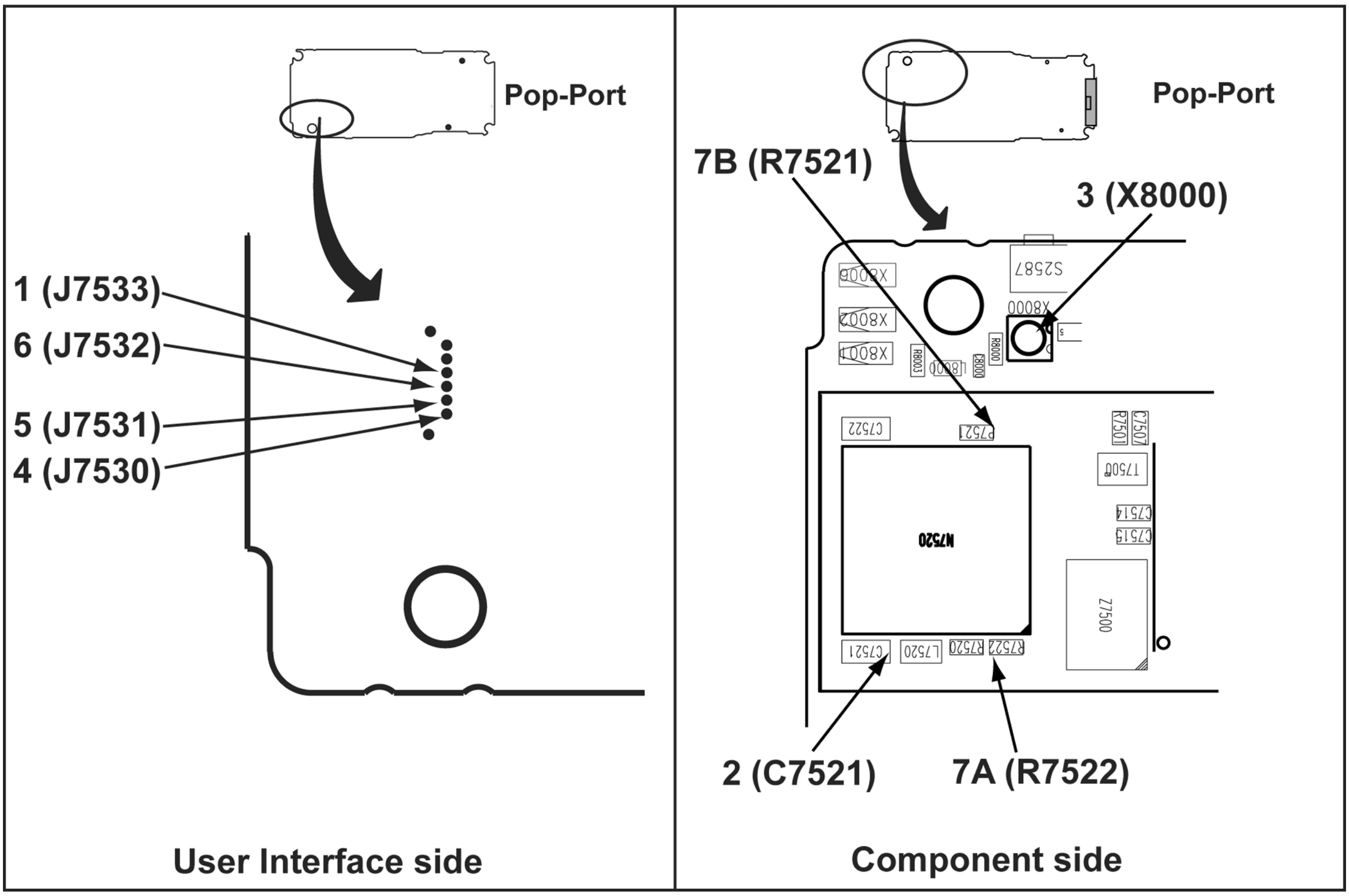

Pop-Port
1 (J7533)
6 (J7532)
5 (J7531)
4 (J7530)
User Interface side
Pop-Port
7B (R7521)
3 (X8000)
N7520
2 (C7521)
7A (R7522)
Component side

Figure 76 GSM900/1800/1900 TX test points

WCDMA Receiver

WCDMA RX Troubleshooting

Preparations

Set Phoenix to RF local mode WCDMA RX.

Equipment/Settinig	Unit
Phoenix	
WCDMA	FDD
RF channel	2140MHz ~10700
Frequency offset	+0.000kHz

Equipment/Settinig	Unit
Output channel power	-60dBm
	P-sch~ -2dB S-sch~ -2dB P-cc pch~ -2dB DPDch~ -7dB
AGCMod*	Algorithm
Channel*	10700
BB AGC*	0dB
Spectrum analyzer*	
Span	~ 20MHz
Centre frequency	2140MHz
VBW	500kHz
RBW	500kHz
Output channel power	-30dB
RF AH	~ 30dB

Check the following

Check the levels in the steps below.

NO.	Signal Name	Test point	Check
1	PXIP (out)	J7515	720mVpp single ended
2	RXQP (OUT)	J7516	720mVpp single ended
3*	WCDMA_RX	T7500	Average: -30dBm -48.3dBm

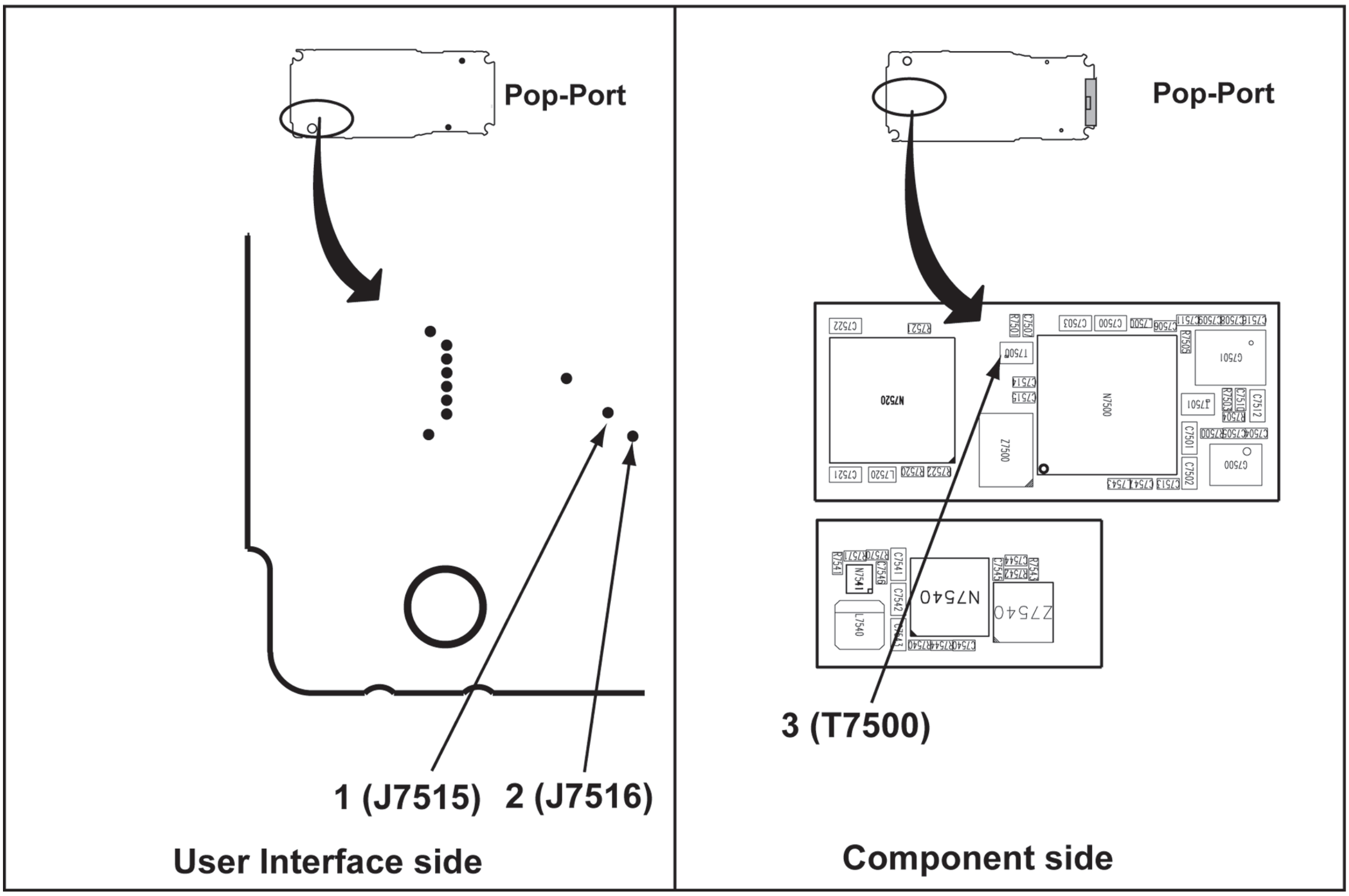

Pop-Port
1 (J7515)
2 (J7516)
User Interface side
Pop-Port
N7540
Z7540
3 (T7500)
Component side

Figure 77 WCDMA RX test points

WCDMA Transmitter

WCDMA TX Troubleshooting

Preparations

Set Phoenix to RF local mode WCDMA TX.

Check the following

Check the levels in the steps below.

NO.	Signal Name	Test point	Check
1	WTXDET	C7544	115mVDC
2	VBAT	C7542	3.82VDC
3	PA supply - Vreg	C7543	2VDC
4	RF level - ANT_WCDMA	X8003	0dBm on antenna
5	WCDMA_TX	L7543	-34.75dBm at 1450MHz
6	WDET	C7545	2.75mVDC
7	DAC101	R7541	828mVDC
	DAC201	J7536	2.5VDC

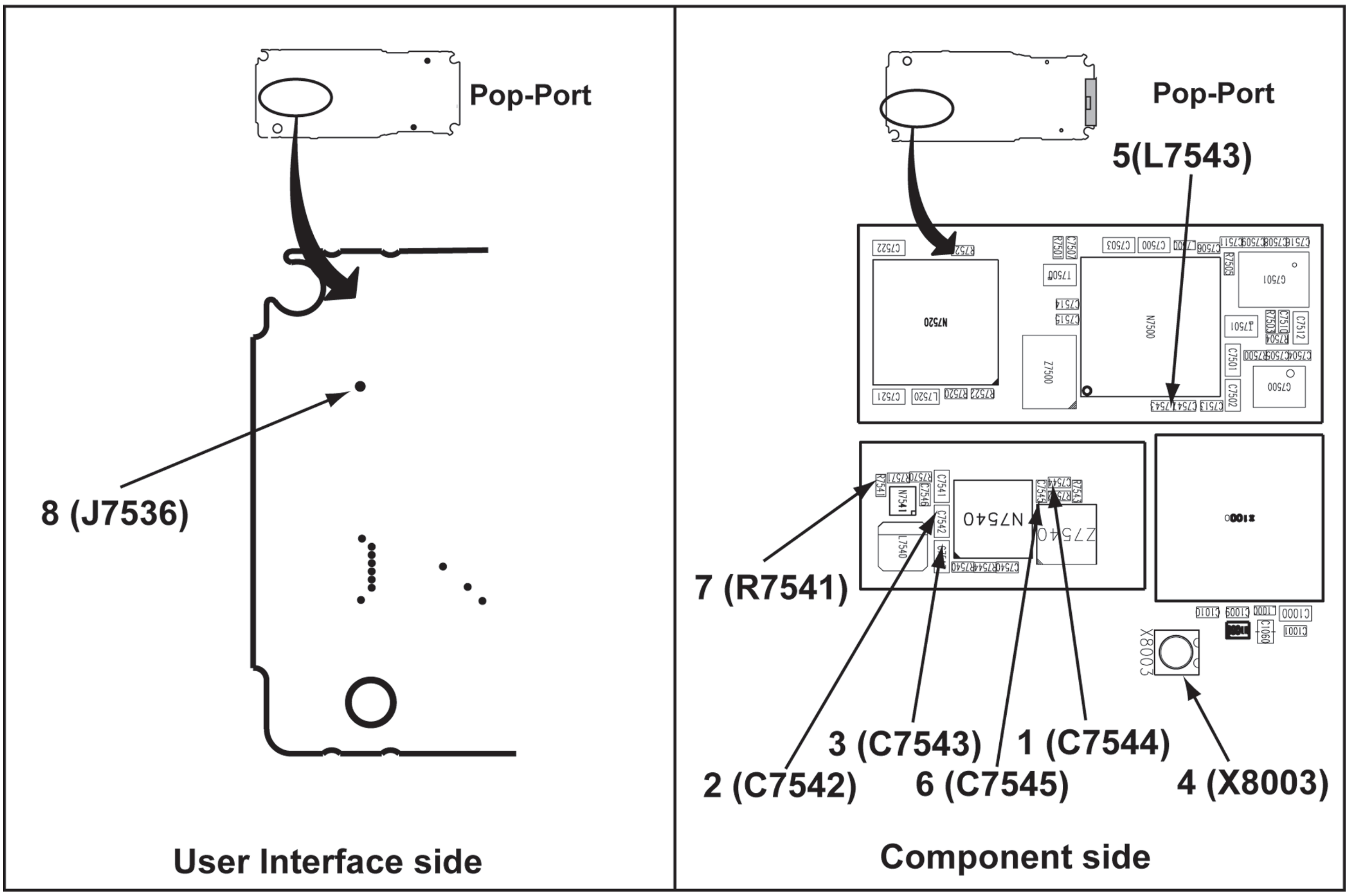

Pop-Port
8 (J7536)
User Interface side
Pop-Port
5(L7543)
7 (R7541)
3 (C7543)
1 (C7544)
2 (C7542)
6 (C7545)
4 (X8003)
Component side

Figure 78 WCDMA TX test points

Synthesizer troubleshooting

PIHI (N7500) Troubleshooting

Preparations

Set Phoenix to RF local mode RX burst.

Check the following

Check the voltages in the steps below.

NO.	Signal Name	Test point	Check GSM900
Suppliers			
1	VBATRF (in)	L7500	3.8VDC
2	VR1_RX (out)	C7503	2.8VDC
3	VR1_TX (out)	C7502	2.8VDC
4	VR2_TX (out)	C7501	2.8VDC
5	VREFRF01 (in) VB_EXT	R7501	1.36VDC
6	VCP1 (in)	C7513	4.76VDC

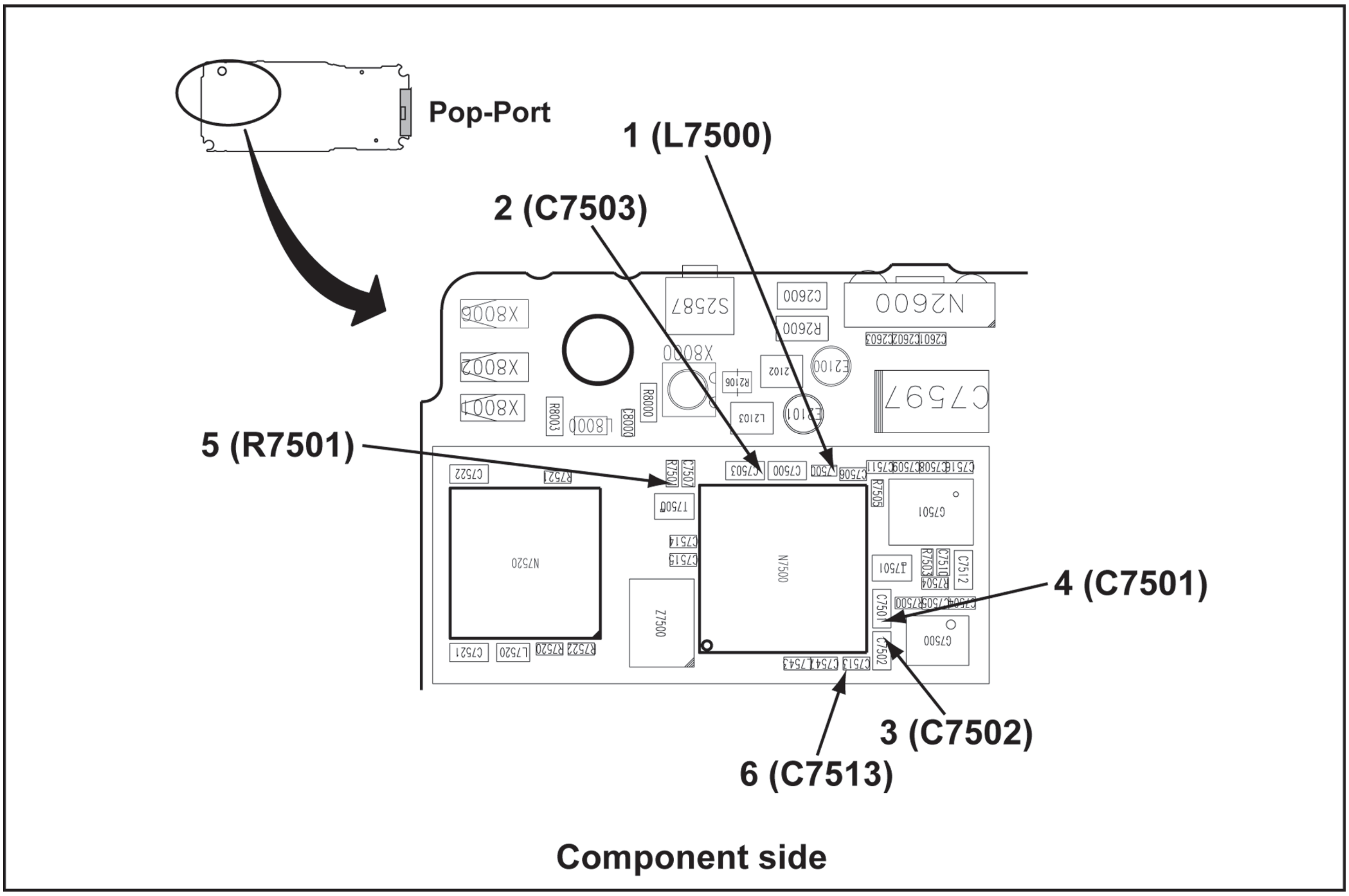

Pop-Port
1 (L7500)
2 (C7503)
5 (R7501)
4 (C7501)
3 (C7502)
6 (C7513)
N7500
N7520
Component side

Figure 79 PIHI (N7500) test points

Synthesizer Troubleshooting

Preparations

Set Phoenix to RF local mode RX continuous.

Check the following

Check the levels in the steps below.

NO.	Signal Name	Test point	Check
VCTCXO			
1	VXO (in)	C7504	2.4VDC
2	OSCIN	C7500	85mVpp at 38.4MHz
3	AFC (in)	R7500	1.2VDC
4	RFCLKEXT (out)	C7506	750mVpp at 38.4MHz
VCO			
5	VVCO_EXT	R7505	2.72VDC
6	VCO Output	T7501	-17dBm at 3769.6MHz
7	VCO Control	C7510	2.7VDC

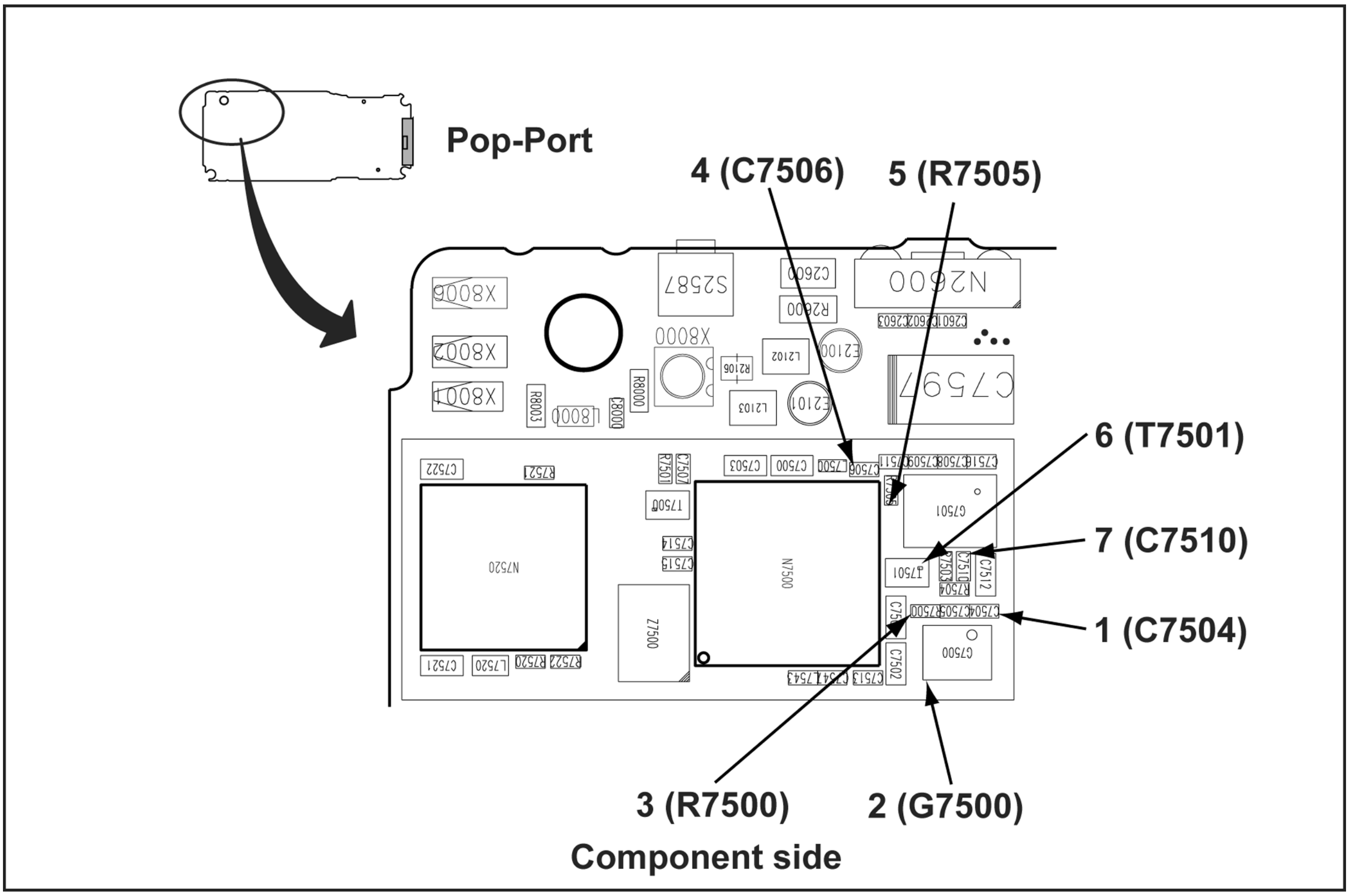

Pop-Port
4 (C7506)
5 (R7505)
6 (T7501)
7 (C7510)
1 (C7504)
3 (R7500)
2 (G7500)
Component side

Figure 80 Synthesizer test points

Bluetooth and FM radio

Bluetooth troubleshooting

Troubleshooting flow

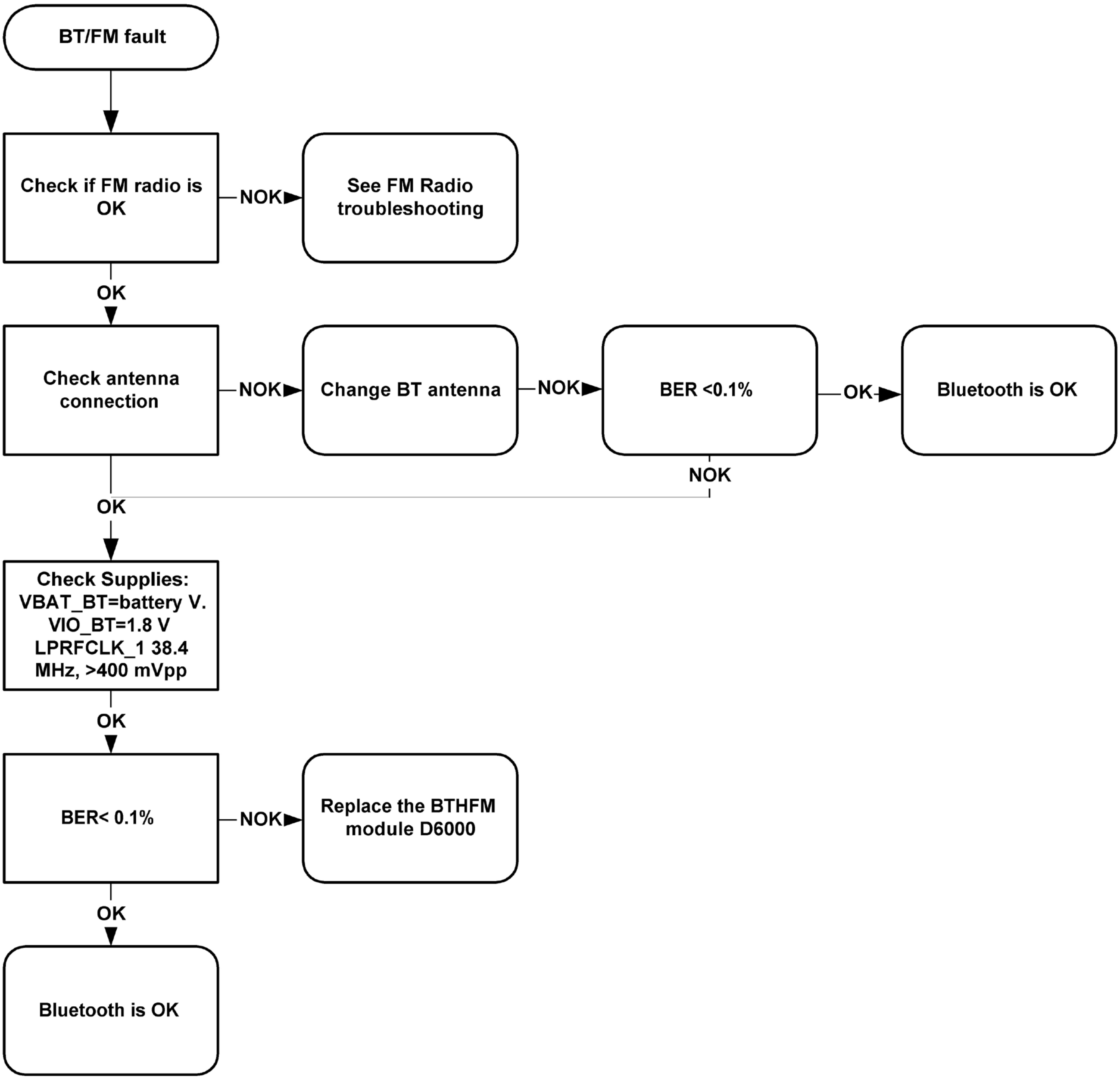

BT/FM fault
Check if FM radio is OK
NOK
See FM Radio troubleshooting
OK
Check antenna connection
NOK
Change BT antenna
NOK
BER <0.1%
OK
Bluetooth is OK
NOK
OK
Check Supplies: VBAT_BT=battery V. VIO_BT=1.8 V LPRFCLK_1 38.4 MHz, >400 mVpp
OK
BER< 0.1%
NOK
Replace the BTHFM module D6000
OK
Bluetooth is OK

Figure 81 Troubleshooting diagram: Bluetooth

FM radio troubleshooting

Troubleshooting flow

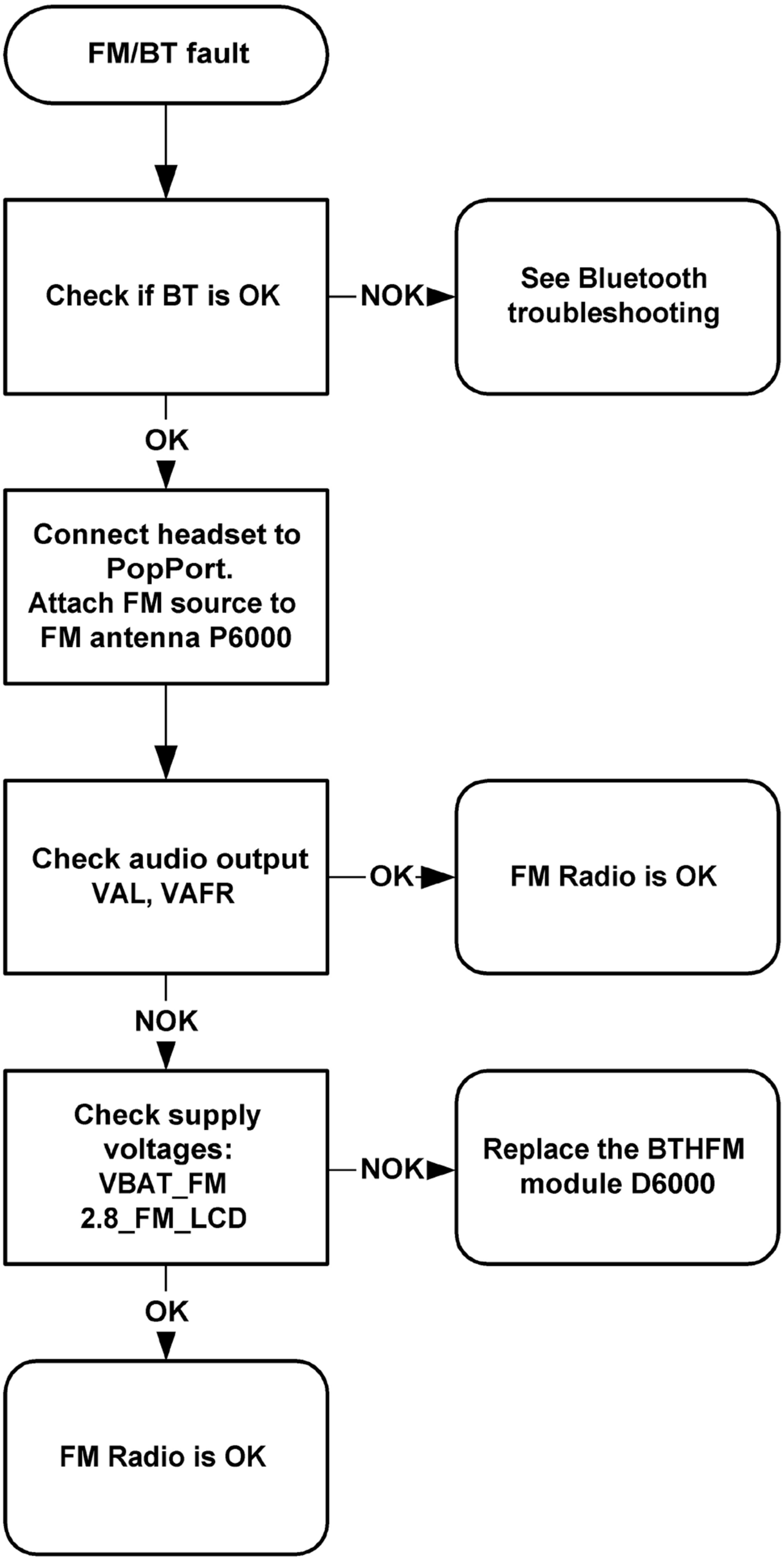

FM/BT fault
Check if BT is OK
NOK
See Bluetooth troubleshooting
OK
Connect headset to PopPort. Attach FM source to FM antenna P6000
Check audio output VAL, VAFR
OK
FM Radio is OK
NOK
Check supply voltages: VBAT_FM 2.8_FM_LCD
NOK
Replace the BTHFM module D6000
OK
FM Radio is OK

Figure 82 Troubleshooting diagram: FM radio

9 — System Module

(This page left intentionally blank.)

Table of Contents

Introduction....9–5
    Block diagram....9–5
Energy management....9–5
    Battery and interface....9–5
    Normal and extreme voltages....9–6
    Power key and system power-up....9–6
    Modes of operation....9–7
    Power distribution....9–8
    Internal regulators....9–8
    External regulators....9–10
    Clocking scheme....9–10
USB, SIM, MMC....9–11
    USB....9–11
    SIM interface....9–11
Cameras....9–12
    Back camera....9–12
    Flash LED....9–13
    Front camera....9–14
User interface....9–15
    Display interface....9–15
    Top keyboard....9–16
    Main keyboard....9–16
Audio concept....9–17
    Audio HW architecture....9–17
    Internal microphone....9–18
    External microphone....9–18
    Internal earpiece....9–19
    Internal speaker....9–19
    External earpiece....9–20
    Vibra circuitry....9–20
    Pop-portTM connector....9–21
Bluetooth and FM radio....9–22
    Bluetooth....9–22
    FM radio....9–23
RF description....9–24
    Introduction to receiver functionality....9–24
    WCDMA receiver....9–24
    GSM receiver....9–24
    Introduction to transmitter functionality....9–24
    WCDMA transmitter functionality....9–25
    GSM transmitter functionality....9–26
    Frequency synthesizers....9–27
    Regulators....9–28

List of Tables

Table 14 Nominal voltages....9–6
Table 15 Internal regulators....9–9
Table 16 External regulators....9–10
Table 17 Pop-PortTMpin and signal table....9–21

List of Figures

Figure 83 Block diagram........9–5
Figure 84 Battery pin order........9–6
Figure 85 Power regulator diagram........9–8
Figure 86 Clocking scheme........9–11
Figure 87 SIM interface........9–12
Figure 88 Block diagram of the back camera module........9–13
Figure 89 Simplified flash LED connection........9–14
Figure 90 Front camera connections........9–15
Figure 91 General diagram of the LCD module........9–15
Figure 92 Top keyboard keys........9–16
Figure 93 Main keyboard........9–17
Figure 94 Audio block diagram........9–8
Figure 95 Internal microphone circuitry........9–18
Figure 96 External microphone circuitry (Pop-Port connects to the right side)........9–19
Figure 97 Internal earpiece circuitry........9–19
Figure 98 Internal speaker circuitry........9–19
Figure 99 External earpiece circuitry (Pop-Port connected on the right)........9–20
Figure 100 Vibra circuitry........9–21
Figure 101 System connector pin layout........9–21
Figure 102 Bluetooth interface........9–23
Figure 103 FM interface........9–23
Figure 104 WCDMA transmitter........9–25
Figure 105 Block diagram of DC/DC converter and WCDMA PA........9–26
Figure 106 GSM transmitter........9–27
Figure 107 RF supply connections from the BB mixed mode ASIC........9–28

Introduction

Block diagram

RAP3G is the main digital baseband ASIC in the phone. It contains functionality for both WCDMA and GSM EDGA and the Golden Eye is used as a co-processor.

Retu is mainly the audio ASIC in the phone and Tahvo is basically the energy management controller for the phone.

Bluetooth and stereo FM Radio is integrated in one single ASIC.

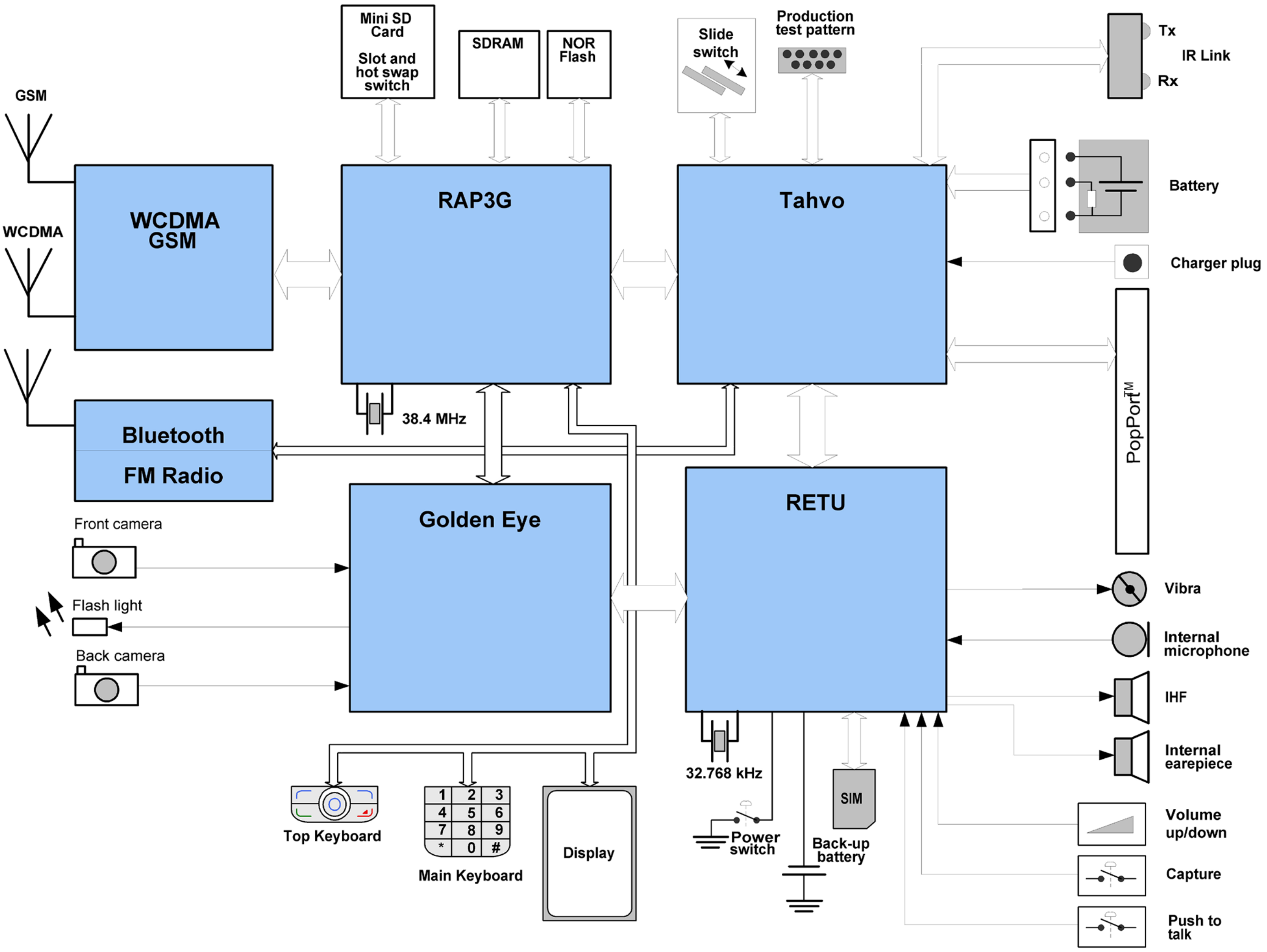

Mini SD Card
Slot and hot swap switch
SDRAM
NOR Flash
Slide switch
Production test pattern
Tx
IR Link
Rx
GSM
WCDMA
WCDMA GSM
RAP3G
Tahvo
Battery
Charger plug
PopPort™
38.4 MHz
Bluetooth
FM Radio
Golden Eye
RETU
Front camera
Flash light
Back camera
Vibra
Internal microphone
IHF
Internal earepiece
32.768 kHz
SIM
Power switch
Back-up battery
Volume up/down
Capture
Push to talk
Top Keyboard
1 2 3 4 5 6 7 8 9 * 0 #
Main Keyboard
Display

Figure 83 Block diagram

Energy management

Battery and interface

The phone i powered by a 3-pole BP-6M 900 mAh battery. The three poles are named VBAT, BSI and GND where the BSI line is used to recognize the battery capacity. This is done by means of an internal battery pull down resistor.

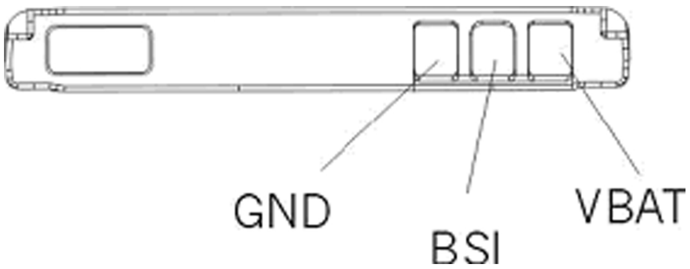


Figure 84 Battery pin order

Battery temperature is estimated by measuring separate battery temperature NTC via the BTEMP line, which is located on the main PWB, at a place where the phone temperature is most stabile.

The connection from the charger connector to the charger is established via a charger adaptor type CA-44.

For service purposes, the device SW can be forced into local mode by using pull down resistors connected to the BSI line.

Normal and extreme voltages

Energy management is mainly carried out in the two Application Specific Integrated Circuits (ASICs) RETU and TAHVO. These two circuits contains a number of regulators. In addition there are some external regulators too.

In the table below normal and extreme voltages are shown when a BP-6M battery is used.

Table 14 Nominal voltages

Voltage	Voltage [V]	Condition
General Conditions		
Nominal voltage	3.7	*
Lower extreme voltage	3.145	**
Higher extreme voltage	4.23	***
(fast charging)		
HW Shutdown Voltages		
Vmstr+	2.1 ± 0.1	Off to on
Vmstr-	1.9 ± 0.1	On to off
SW Shutdown Voltages		
Sw shutdown	3.1	In call
Sw shutdown	3.2	In idle
Min Operating Voltage		
Vcoff+	2.9 ± 0.1	Off to on
Vcoff-	2.6 ± 0.1	On to off

Power key and system power-up

When the battery is placed in the phone the power key circuits are energized. When the power key is pressed, the system boots up (if an adequate battery voltage is present).

Power down can be initiated by pressing the power key again (the system is powered down with the aid of SW). The power key is connected to RETU ASIC via PWRONX signal.

Different power-up conditions

Power up can be caused by the following reasons:

- Power key is pressed
- Charger is connected
- RTC alarm occurs
- MBUS wake-up

After that:

- RETU activates sleep clock and VANA, VDRAM, VIO and VR1 regulators.
- Voltage appearing at RETU's RSTX pin is used for enabling TAHVO ASIC.
- TAHVO enables VCORE regulator and its internal RC-oscillator (600kHz).
- VCTCXO regulator is set ON and RF clock (main system clock) is started to produce.
- RETU will release PURX ~ 16ms after power up is enabled (the RF clock is then stable enough).
- Synchronizing clock (2.4MHz) for TAHVO is started to be produced. After PURX is released and two rising edges of 2.4MHz synchronous clock have been detected in SMPSClk input TAHVO is starting to use that instead of 600kHz internal RC-oscillator.
- HW start-up procedure has been finalized and the system is up and running. Now it is possible for SW to switch ON other needed regulators.

Modes of operation

Mode	Description
NO_SUPPLY	(dead) mode means that the main battery is not present or its voltage is too low (below RETU master reset threshold) and that the back-up battery voltage is too low.
BACK_UP	The main battery is not present or its voltage is too low but back-up battery voltage is adequate and the 32kHz oscillator is running (RTC is on).
PWR_OFF	In this mode (warm), the main battery is present and its voltage is over RETU master reset threshold. All regulators are disabled, PurX is on low state, the RTC is on and the oscillator is on. PWR_OFF (cold) mode is almost the same as PWR_OFF (warm), but the RTC and the oscillator are off.
RESET	RESET mode is a synonym for start-up sequence. In this mode certain regulators are enabled and after they and RFClk have stabilized, the system reset (PurX) is released and PWR_ON mode entered. RESET mode uses 32kHz clock to count the REST mode delay (typically 16ms).

Mode	Description
SLEEP	SLEEP mode is entered only from PWR_ON mode with the aid of SW when the system's activity is low. There are in principle three different sleep modes: • Golden Eye sleep • RAP3G sleep • Golden Eye and RAP3G sleep (deep sleep) In SLEEP mode RETU's regulators VIO, VDRAM, VSIM1, VSIM2, VAUX and Vana are in low quiescent current mode (output voltages still present but regulators will not give as much current out). Other regulators including VR1 supplying system clock oscillator are disabled. In SLEEP mode, TAHVO VCORE SMPS regulator is in low quiescent current mode (if sleep mode is not internally disabled). Linear regulator VOUT state depends on the accessory connected to the system connector (Pop-Port), if there is any.
FLASHING	FLASHING mode is for SW downloading.

Power distribution

The power distribution is shown in the diagram below. Current consumption is measured via the Current Gauge Resistor and the battery voltage is stabilized by means of a capacitor. The tables below specifies the voltages.

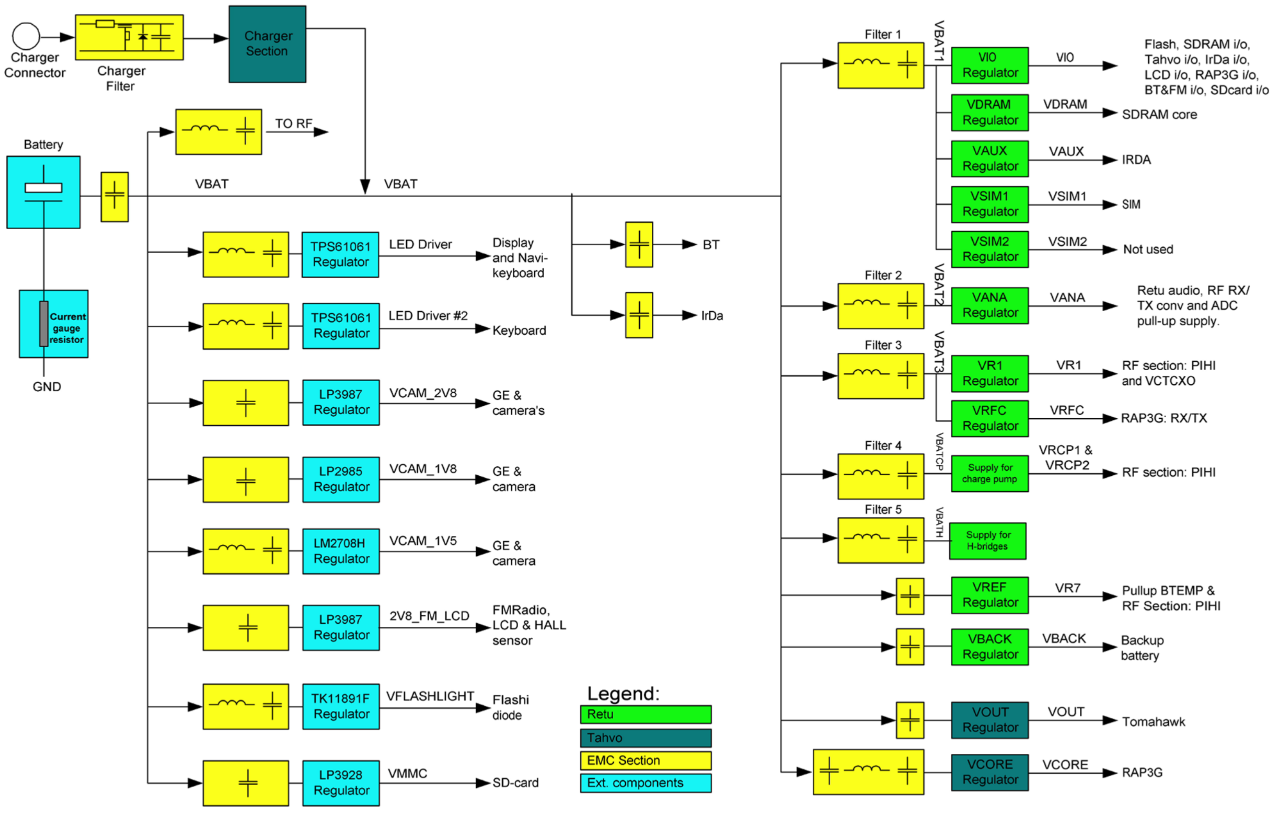

Charger Connector
Charger Filter
Charger Section
TO RF
Battery
VBAT
VBAT
Current gauge resistor
GND
TPS61061 Regulator
LED Driver
Display and Navi-keyboard
TPS61061 Regulator
LED Driver #2
Keyboard
LP3987 Regulator
VCAM_2V8
GE & camera's
LP2985 Regulator
VCAM_1V8
GE & camera
LM2708H Regulator
VCAM_1V5
GE & camera
LP3987 Regulator
2V8_FM_LCD
FMRadio, LCD & HALL sensor
TK11891F Regulator
VFLASHLIGHT
Flashi diode
LP3928 Regulator
VMMC
SD-card
BT
IrDa
Legend:
Retu
Tahvo
EMC Section
Ext. components
Filter 1
VBAT1
VIO Regulator
VIO
Flash, SDRAM i/o, Tahvo i/o, IrDa i/o, LCD i/o, RAP3G i/o, BT&FM i/o, SDcard i/o
VDRAM Regulator
VDRAM
SDRAM core
VAUX Regulator
VAUX
IRDA
VSIM1 Regulator
VSIM1
SIM
VSIM2 Regulator
VSIM2
Not used
Filter 2
VBAT2
VANA Regulator
VANA
Retu audio, RF RX/TX conv and ADC pull-up supply.
Filter 3
VBAT3
VR1 Regulator
VR1
RF section: PIHI and VCTCXO
VRFC Regulator
VRFC
RAP3G: RX/TX
Filter 4
VBATCP
Supply for charge pump
VRCP1 & VRCP2
RF section: PIHI
Filter 5
VBATH
Supply for H-bridges
VREF Regulator
VR7
Pullup BTEMP & RF Section: PIHI
VBACK Regulator
VBACK
Backup battery
VOUT Regulator
VOUT
Tomahawk
VCORE Regulator
VCORE
RAP3G

Figure 85 Power regulator diagram

Internal regulators

The table below shows the internal regulators. Also see the Power distribution diagram.

Table 15 Internal regulators

Regulator	Min voltage [V]	Nom voltage [V]	Max voltage [V]	Max load current, normal [mA]	Max load current*, sleep [mA]	Controll ed by	Notes
In RETU:							
VIO	1.72	1.82	1.92	250	2.0	HW	
VSIM1	1.7	1.8	1.9	70	0.5	SW	
	2.8	3.0	3.2	30			
VSIM2	1.7	1.8	1.9	70	0.5	SW	Not used
	2.8	3.0	3.2	30			
Vaux	2.4	2.5	2.6	100	2.2	SW	
	2.7	2.78	2.86				
Vana	2.42	2.5	2.58	80	1	HW	
VDRAM	1.72	1.82	1.92	150	0.7	HW/SW	**
	2.4	2.5	2.6	150			
VRCP1	4.6	4.75	4.9	5 ***	-	SW	Supply to RF part
VRCP2	4.6	4.75	4.9	5 ***	-	SW	Supply to RF part
VR1	2.42	2.5	2.58	15	-	HW	VCTCXO regulator, RF part
VRFC	1.73	1.8	1.87	15	-	SW	Supply to RAP3G RF converters
Vback	2.2	2.5	2.6	0.150	0.150	HW	
In TAHVO:							
VOUT	2.43	2.5	2.57	90	0.5	SW	
VCORE	10.185	1.05	10.815	400	20	HW	SMPS
	12.125	1.25	12.875				
	13.095	1.35	13.905				
	13.580	1.40	14.420				
VCCint	2.43	2.5	2.57	8	-	SW	In FBUS mode In USB mode
	3.0	3.42	3.6				

*) maximum allowable load current in sleep

**) VDRAM output can be fed from VANA or from VIO in sleep mode

***) Total current for charge pump is 6mA (if both regulators are ON at the same time).

External regulators

The table below shows the external regulators. Also see the Power distribution diagram.

Table 16 External regulators

Regulator	Min voltage [V]	Nom voltage [V]	Max voltage [V]	Max load current, normal [mA]	Max load current, sleep [mA]	Controlled by	Notes
LED driver		16		31*	0	SW	Disabled in sleep.
LED driver #2		8		63*	0	SW	Disabled in sleep.
VFLASHLIGHT		18		80	0	SW	Disabled in sleep.
VCAM_2V8**	2.765	2.85	2.936	150	0	SW	Disabled in sleep.
VCAM_1V8**	1.728	1.8	1.872	150	0	SW	Disabled in sleep.
VCAM_1V5**	1.532	1.57	1.617	400	0	SW	Disabled in sleep.
2V8_FM_LCD	2.765	2.85	2.936	150	150	HW	Only turned off in power off mode.
VMMC	2.75	2.85	2.95	150	0	SW	Disabled in sleep.

*) 500mW is max output

Clocking scheme

In BB5.0, two main clocks are provided to the system: 38.4MHz RF clock produced by VCTCXO in RF section and 32.768kHz sleep clock produced by RETU with an external crystal.

RF clock is generated only when VCTCXO is powered on by RETU regulator. Regulator itself is activated by SleepX signals from both RAP3G and Golden Eye. When both CPUs are on sleep, RF clock is stopped.

RF clock is used by RAP3G that then provides (divided) 19.2MHz SysClk further to Golden Eye. Both RAP3G and Golden Eye have internal PLLs which then create clock signals for other peripheral devices/interfaces like RS MMC, SIM, CCP, I2C and memories.

32k Sleep Clock is always powered on after startup. Sleep clock is used by RAP3G and OMAP for low-power operation.

SMPS Clk is 2.4MHz clock line from RAP3G to TAHVO used for switch mode regulator synchronizing in active mode. In deep sleep mode, when VCTCXO is off, this signal is set to '0'-state.

BT Clk is 38.4MHz signal from HINKU ASIC to BT module.

CLK600 is 600KHz signal from TAHVO to APE VCORE SMPS. The clock source is internal RC oscillator in TAHVO (during the power-up sequence) or RAP3G SMPS Clk divided by 4 after the power-up sequence.

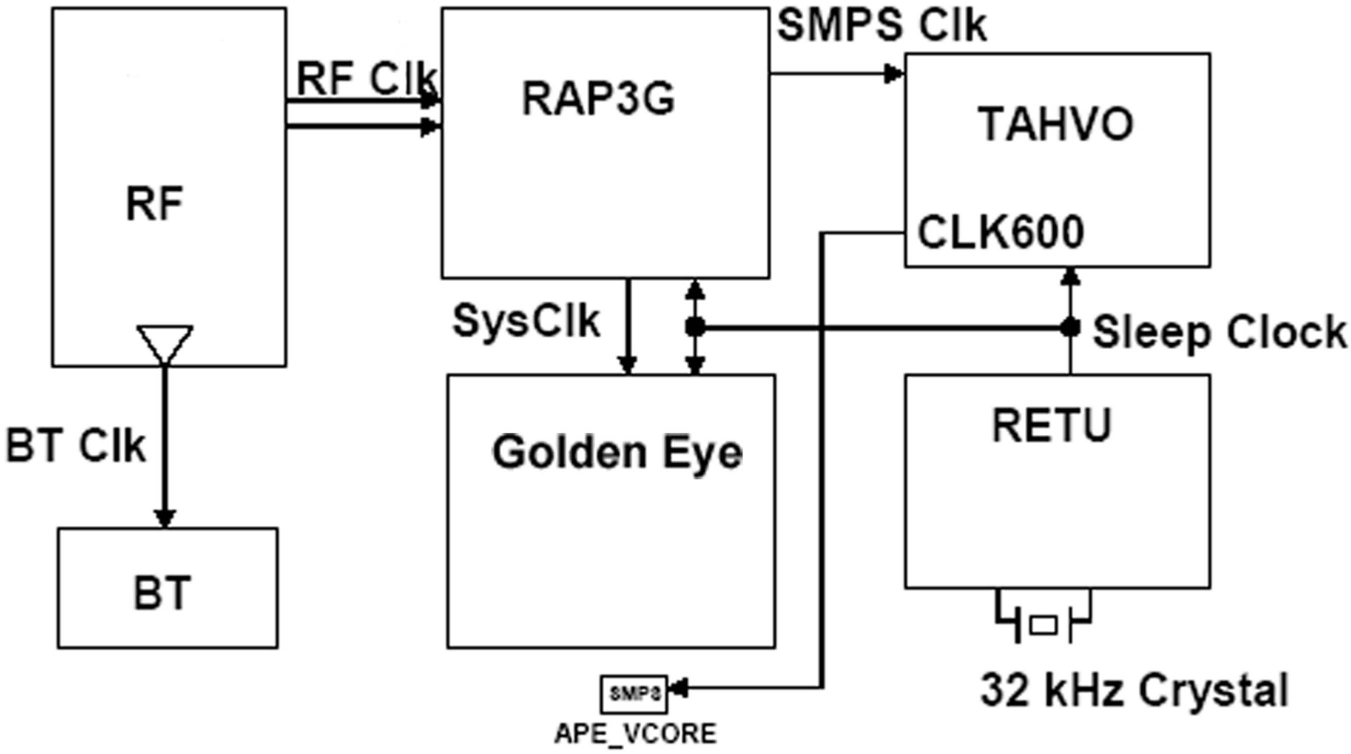


Figure 86 Clocking scheme

USB, SIM, MMC

USB

USB (Universal Serial Bus) provides a wired connectivity between a USB host PC and peripheral devices.

USB is a differential serial bus for USB devices. USB controller (RAP3G) supports USB specification revision 2.0 with full speed USB (12 Mbps). The device is connected to the USB host through the Pop-Port™ connector. The USB bus is hot plugged capable, which means that USB devices may be plugged in/out at any time.

SIM interface

The device has one SIM (Subscriber Identification Module) interface. It is only accessible if battery is removed. The SIM interface consists of an internal interface between RAP3G and Retu and of an external interface between Retu and SIM contacts. The main SIM interface functionality is in RAP3G while Retu takes care of power up/down, card detection, ATR (Answer To Reset) counting and level shifting. For Retu external SIM IF connections, see SIM interface connections (page).

The SIM IF is shown in the following figure:

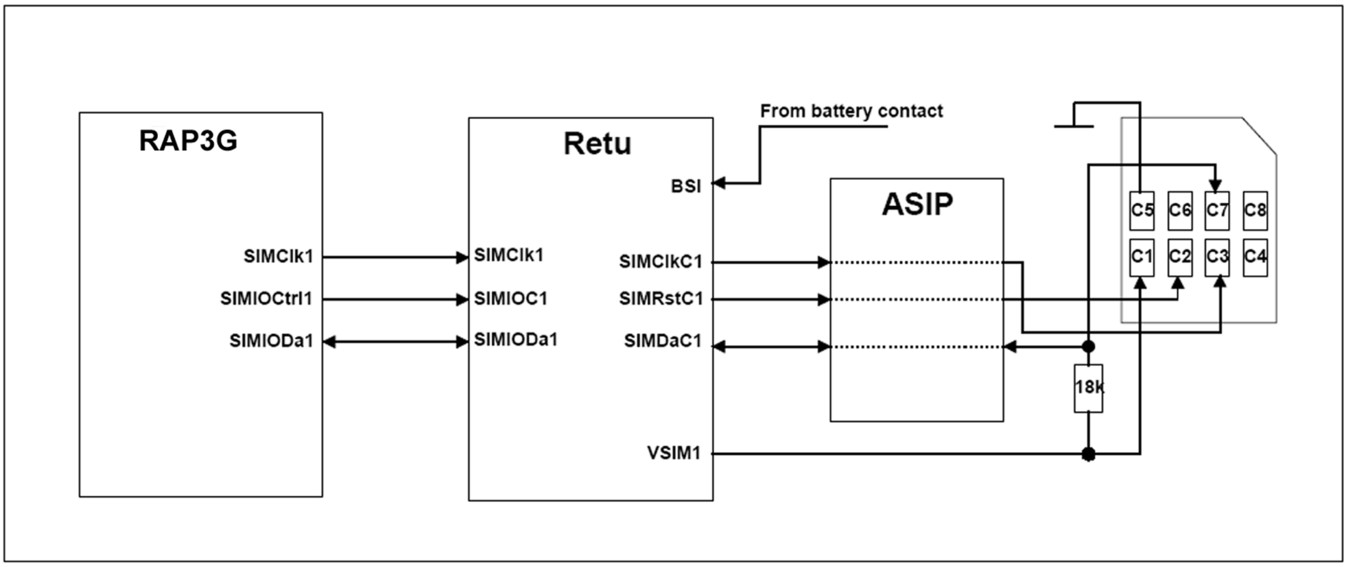


Figure 87 SIM interface

Retu handles the detection of the SIM card. The detection method is based in the BSI line. Because of the location of the SIM card, removing the battery causes a quick power down of the SIM IF.

The Retu SIM1 interface supports both 1.8V and 3.0V SIM cards. The SIM interface voltage is first 1.8V when the SIM card is inserted, and if the card does not response to the ATR a 3V interface voltage is used.

The data communication between the card and the phone is asynchronous half duplex, and the clock supplied to the card is 1-5MHz, which is 3.2MHz by default (in GSM system). The data baud rate is the SIM card clock frequency divided by 372 (by default), 64, 32 or 16.

Cameras

Back camera

The back camera of the device uses a 2.0 megapixel camera module with a sensor resolution of 16000 x 1200. The following block diagram shows how a CCP bus is used to transfer image data from the camera module to the phone engine. This bi-directional control bus is a software-implemented I2C interface.

The camera regulator N1470 powers the digital parts of the camera, and a VAUX power rail is used for powering the analogue parts.

A CAMVCTRL signal (Vctrl) is used for activating the camera module. When the Vctrl signal is High, the module enters the power on mode. When the signal is Low, the module enters the power off mode.

A CAMCLK signal feeds the system clock for the camera module.

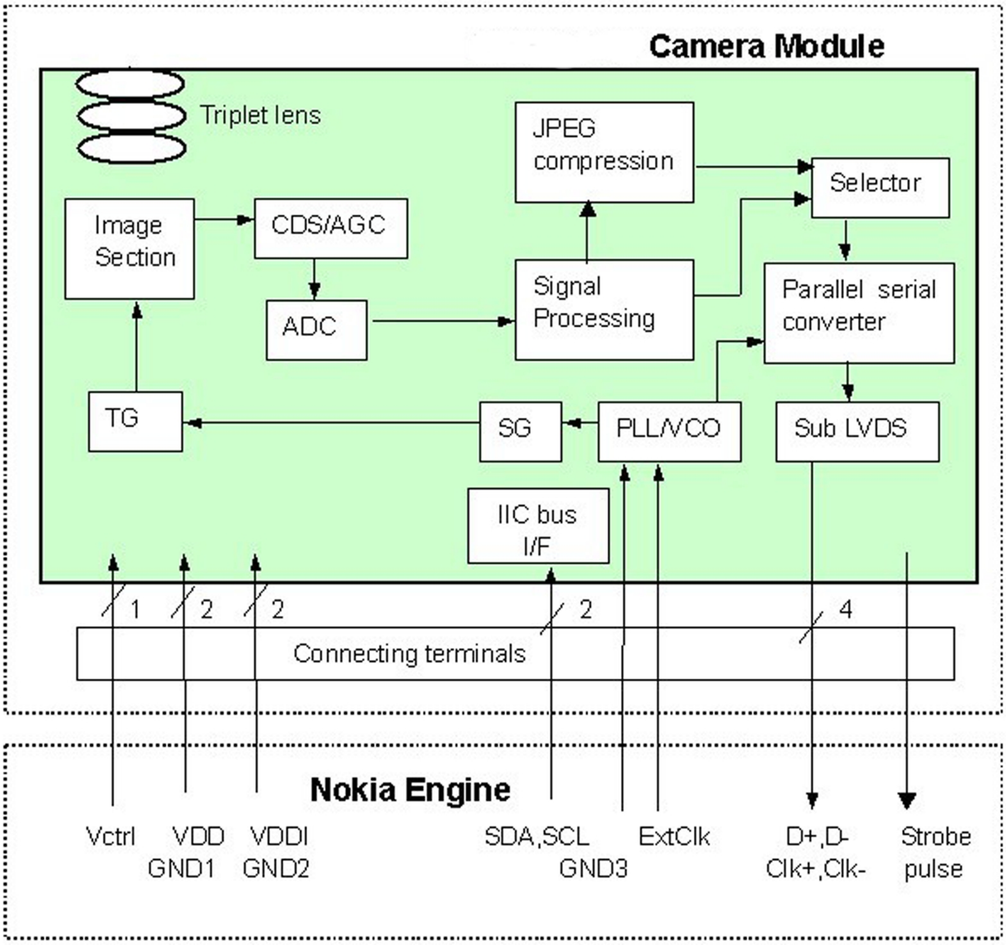

Camera Module
Triplet lens
JPEG compression
Selector
Image Section
CDS/AGC
ADC
Signal Processing
Parallel serial converter
TG
SG
PLL/VCO
Sub LVDS
IIC bus I/F
1
2
2
2
4
Connecting terminals
Nokia Engine
Vctrl
VDD GND1
VDDI GND2
SDA,SCL GND3
ExtClk
D+,D- Clk+,Clk-
Strobe pulse

Figure 88 Block diagram of the back camera module

Flash LED

The device back camera includes a flash LED (FLED) providing better lighting conditions in darker environments. The same LED is also used as an indicator light for indicating when a video clip is being recorded.

The FLED is located beside the back camera. It is only used when the back camera is in the still image mode or as an indicator for video recording or image capturing. The operating range of FLED is approximately 1 m (~22 Lux) and 1.5 m (~9 Lux).

The connections between the main PWB and the FLED is implemented with a small PWB attached to the device mechanics.

The FLED has four white LEDs connected in series in one module. The module also includes a lens with its plastic housing. The dimensions of the FLED are 6.5 x 7.5 x 3.5 mm.

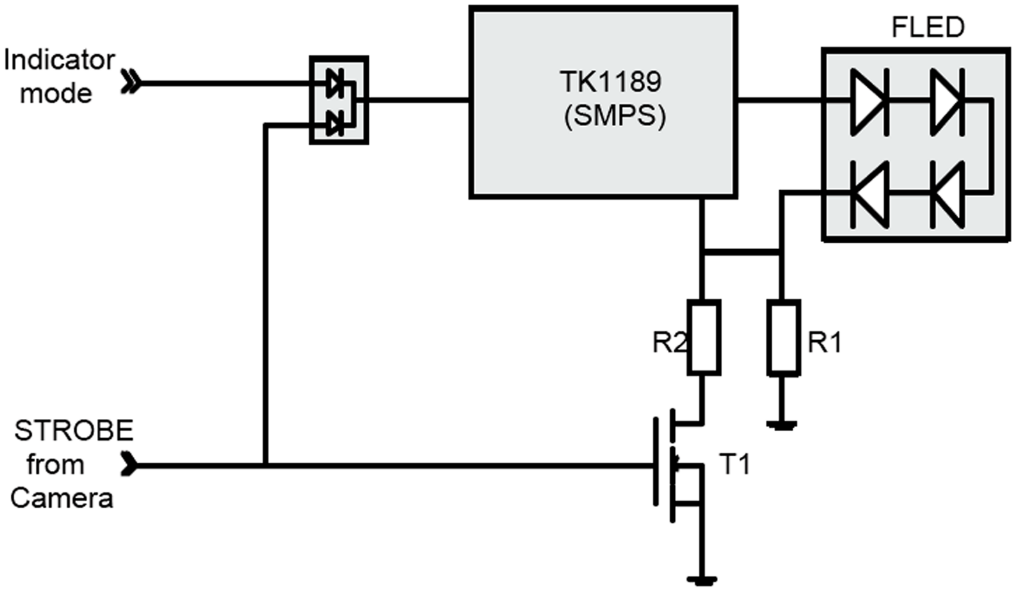


Figure 89 Simplified flash LED connection

Front camera

The front camera has VGA (640x480) resolution, and it is mainly used for video calls. It can also be used as a still camera and camcorder.

The front camera is controlled and its data is collected by Golden Eye APE. The I/O voltage of Golden Eye is 1.8V and the I/O voltage of the camera is 2.8V. Because of this, a level shifter is used for the interface between Golden Eye and the camera.

The front camera has the following characteristics:

Sensor type:	CMOS
Sensor Photo detectors:	300k
F number/Aperture:	f/2.8
Focal length:	2.13 mm
Focus range:	40 cm to infinity
Still Image resolutions:	640 x 480
Video resolutions:	176 x 144, 128 x 96 both 15 frames per second.
Video clip length:	30 seconds or free, maximal clip length in free mode is 1 hour
Video file format:	3GPP, *.3gp (64 kbps in short clip mode, 128 kbps in maximum mode)
Exposure:	Automatic
White Balance:	Automatic
ISO:	250 - 2000 (Automatic)
Capture Modes:	Night mode, Sequence mode, Selftimer

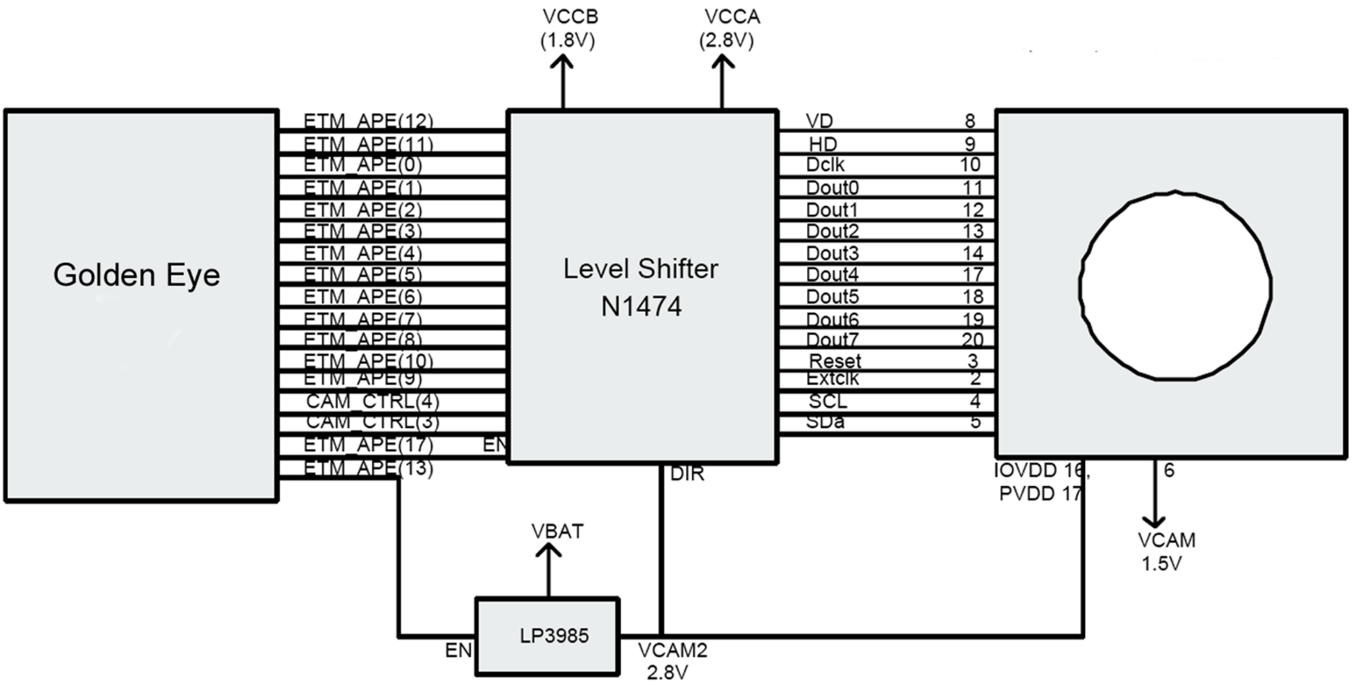

VCCB
(1.8V)
VCCA
(2.8V)
Golden Eye
ETM_APE(12)
ETM_APE(11)
ETM_APE(0)
ETM_APE(1)
ETM_APE(2)
ETM_APE(3)
ETM_APE(4)
ETM_APE(5)
ETM_APE(6)
ETM_APE(7)
ETM_APE(8)
ETM_APE(10)
ETM_APE(9)
CAM_CTRL(4)
CAM_CTRL(3)
ETM_APE(17)
ETM_APE(13)
EN
Level Shifter
N1474
VD 8
HD 9
Dclk 10
Dout0 11
Dout1 12
Dout2 13
Dout3 14
Dout4 17
Dout5 18
Dout6 19
Dout7 20
Reset 3
Extclk 2
SCL 4
SDa 5
DIR
IOVDD 16,
PVDD 17
6
VCAM
1.5V
VBAT
LP3985
EN
VCAM2
2.8V

Figure 90 Front camera connections

User interface

Display interface

Display module mechanical concept

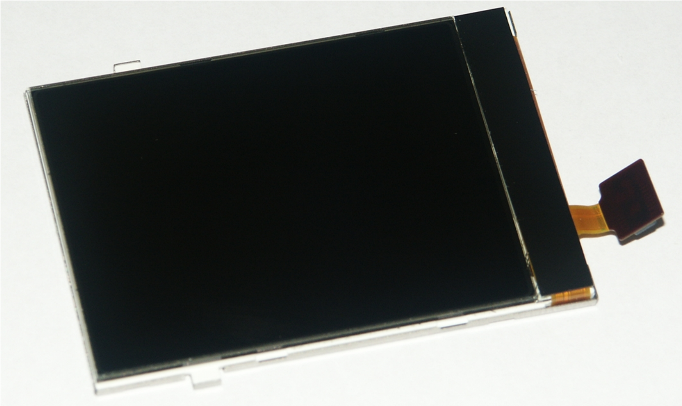


Figure 91 General diagram of the LCD module

Display features:

- 262 k colours
- Partial display function Power saving by pausing display process on part of the screen.
- Built-in RAM capacity 176rows×208lines×16bit = 585,728 bits

The display has two different operating modes:

1 Normal mode, Full screen, 262k colours

2 Normal Partial mode, 262k colours but only part of the display is active

The interconnection between the LCD module and the Nokia engine is implemented with a 24-pin board-to-board connector.

Display is controlled via MeSSi-8 interface by Golden Eye. All MeSSi-8 signals go through the EMC filtering ASIPs.

The display module does not require any tuning in service.

Top keyboard

The UI-Keys a placed on normal rigid FR4 board connected through the flex to the main PWB. All keys on the top UI board have a dedicated line. All lines are routed through a 10 channel Key-ASIP Z3300.

The top keypad contains 2 backlight LEDs.

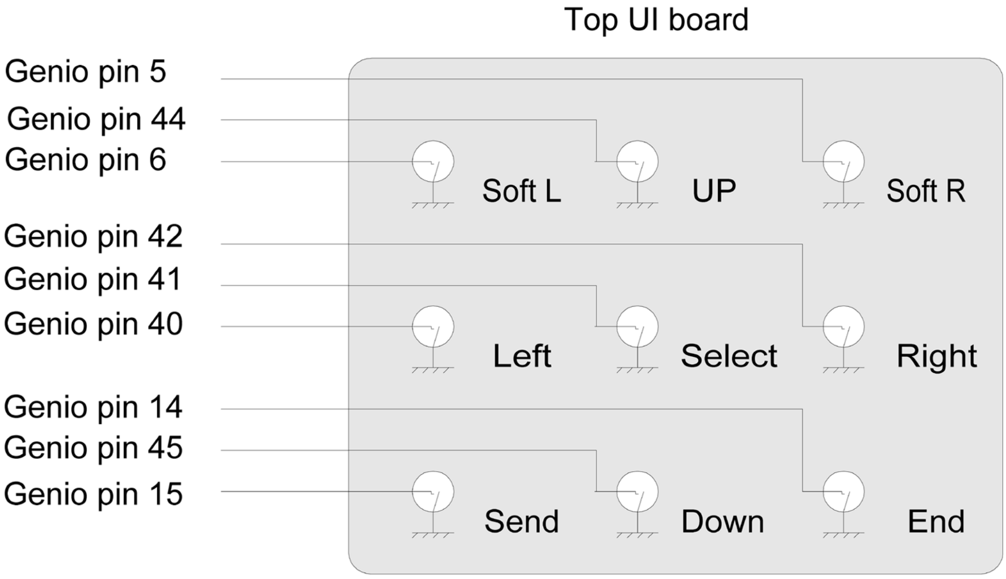

Top UI board
Genio pin 5
Genio pin 44
Genio pin 6
Soft L
UP
Soft R
Genio pin 42
Genio pin 41
Genio pin 40
Left
Select
Right
Genio pin 14
Genio pin 45
Genio pin 15
Send
Down
End

Figure 92 Top keyboard keys

Main keyboard

All keys on the main board are included in a 4x4 key scan matrix. All lines are routed through 10 channal Key-ASIP Z2580.

The main keyboard contains 2 backlight LEDs.

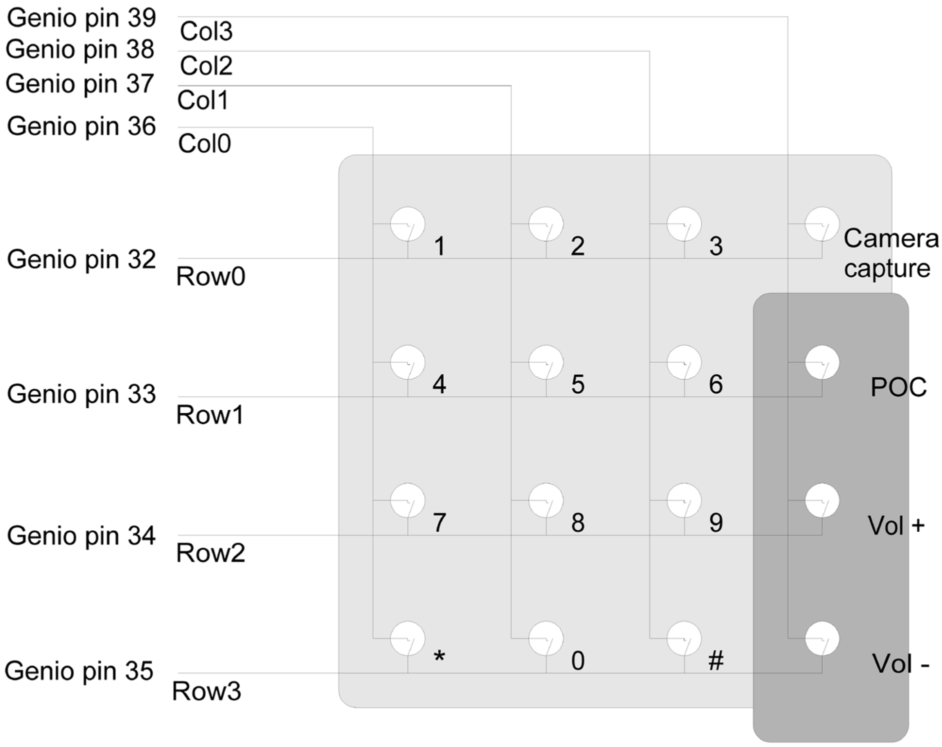

Genio pin 39
Genio pin 38
Genio pin 37
Genio pin 36
Col3
Col2
Col1
Col0
Genio pin 32
Row0
Genio pin 33
Row1
Genio pin 34
Row2
Genio pin 35
Row3
1
2
3
Camera capture
4
5
6
POC
7
8
9
Vol +
*
0
#
Vol -

Figure 93 Main keyboard

Audio concept

Audio HW architecture

The functional core of the audio hardware is built around two ASICs: RAP 3G CMT engine ASIC and the mixed-signal ASIC Retu.

Retu provides an interface for the transducers and the accessory connector. Because audio amplifiers are also integrated into Retu, the only discrete electronics components needed for audio paths are audio filtering components and EMC/ESD components.

There are three audio transducers:

- 8mm dynamic earpiece
- 16mm dynamic speaker (IHF)
- electret microphone module

In addition to the audio transducers, Retu also provides an output for the dynamic vibra component.

All galvanic audio accessories are connected to the Pop-Port™ accessory connector.

A Bluetooth audio module that is connected to RAP3G supports Bluetooth audio functionality. There is a FM stereo radio integrated with the Bluetooth ASIC.

There is a separate application ASIC, Golden Eye, for Symbian applications.

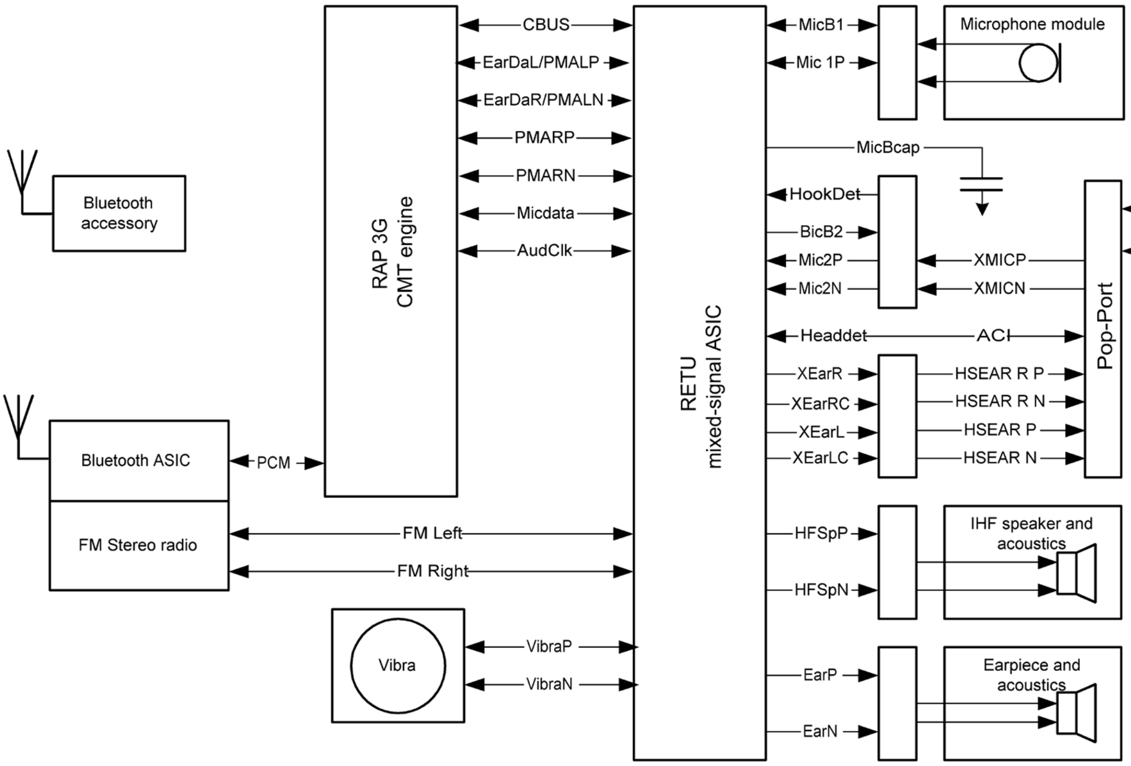

RAP 3G
CMT engine
RETU
mixed-signal ASIC
CBUS
EarDaL/PMALP
EarDaR/PMALN
PMARP
PMARN
Micdata
AudClk
Bluetooth accessory
Bluetooth ASIC
PCM
FM Stereo radio
FM Left
FM Right
Vibra
VibraP
VibraN
MicB1
Mic 1P
Microphone module
MicBcap
HookDet
BicB2
Mic2P
Mic2N
XMICP
XMICN
Headdet
ACI
Pop-Port
FM Radio antenna in HandsFree
Pop-Port accessory
XEarR
XEarRC
XEarL
XEarLC
HSEAR R P
HSEAR R N
HSEAR P
HSEAR N
HFSpP
HFSpN
IHF speaker and acoustics
EarP
EarN
Earpiece and acoustics

Figure 94 Audio block diagram

Internal microphone

Internal microphone is used for HandPortable (HP) and Internal HandsFree (IHF) call modes.

An analogue electret microphone is connected to Retu ASIC's Mic1P and Mic1N inputs via asymmetric electrical connection.

The microphone is biased by Retu ASIC MicB1 bias voltage output.

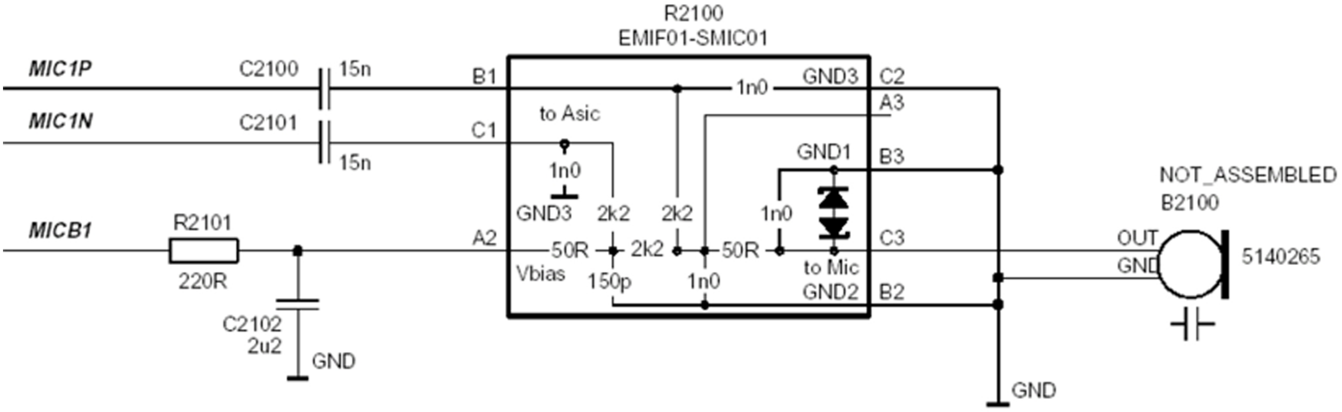

R2100
EMIF01-SMIC01
MIC1P
MIC1N
MICB1
C2100
15n
C2101
15n
R2101
220R
C2102
2u2
GND
B1
C1
A2
to Asic
1n0
GND3
2k2
2k2
1n0
1n0
GND3
GND1
50R
2k2
50R
Vbias
150p
1n0
to Mic
GND2
C2
A3
B3
C3
B2
GND
NOT_ASSEMBLED
B2100
OUT
GND
5140265

Figure 95 Internal microphone circuitry

External microphone

Galvanic accessories are connected to the system connector (Pop-Port^{TM}).

Accessory audio mode is automatically enabled/disabled during connection/disconnection of dedicated phone accessories.

External microphone circuitry is biased by Retu ASIC MicB2 bias voltage output. The circuitry provides a symmetrical connection for the microphone from the Pop-Port^{TM}connections, XMICN and XMICP, to Retu ASIC inputs, Mic2P and Mic2N.

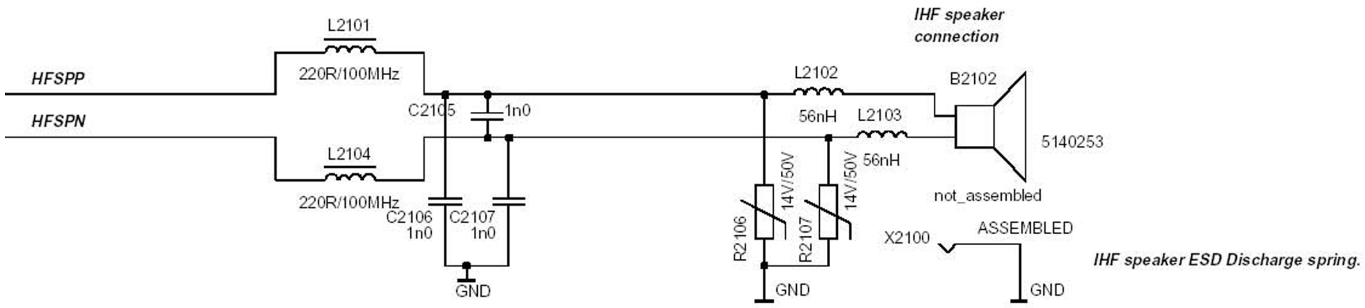

L2101
HFSPP
HFSPN
220R/100MHz
C2105
1n0
L2104
220R/100MHz
C2106
1n0
C2107
1n0
GND
IHF speaker connection
L2102
B2102
56nH
L2103
56nH
5140253
14V/50V
14V/50V
R2106
R2107
not_assembled
X2100
ASSEMBLED
IHF speaker ESD Discharge spring.
GND
GND

Figure 96 External microphone circuitry (Pop-Port connects to the right side)

Internal earpiece

The internal earpiece is used in the HandPortable (HP) call mode. A dynamic 8 mm earpiece capsule is connected to Retu ASIC's differential outputs EarP and EarN.

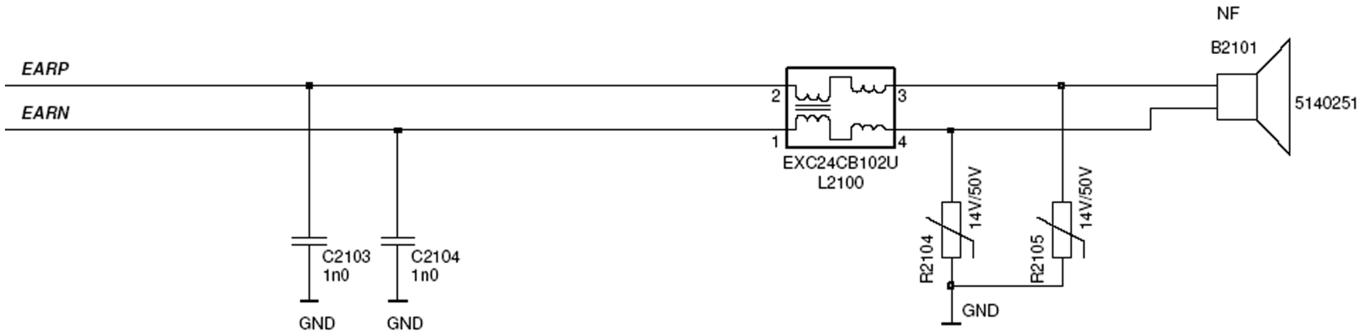

NF
B2101
EARP
EARN
2
3
1
4
EXC24CB102U
L2100
5140251
C2103
1n0
C2104
1n0
GND
GND
R2104
14V/50V
R2105
14V/50V
GND

Figure 97 Internal earpiece circuitry

Internal speaker

The internal speaker is used in Internal HandsFree (IHF) call mode.

A dynamic 16 mm speaker is connected to Retu ASIC's outputs HFSpP and HFSpN.

The IHF amplifier integrated in Retu is a Digital Pulse Modulated Amplifier (DPMA).

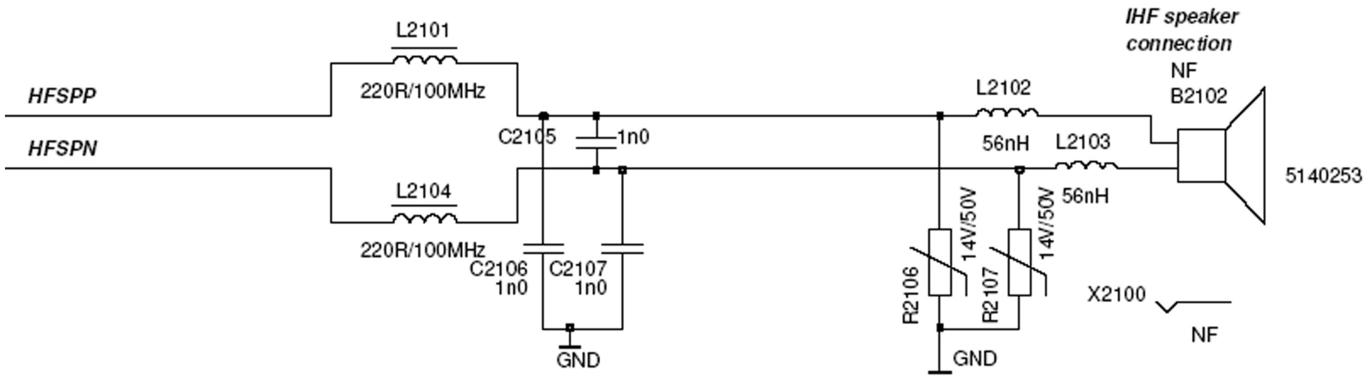

L2101
IHF speaker connection
NF
B2102
HFSPP
220R/100MHz
HFSPN
C2105
1n0
L2102
56nH
L2103
5140253
L2104
220R/100MHz
14V/50V
14V/50V
56nH
C2106
1n0
C2107
1n0
R2106
R2107
X2100
NF
GND
GND

Figure 98 Internal speaker circuitry

External earpiece

All galvanic accessories are connected to the system connector (Pop-Port™).

The accessory audio mode is automatically enabled/disabled during connection/disconnection of dedicated phone accessories.

Retu ASIC provides two output channels in either single-ended or differential format. Retu ASIC outputs XearL and XearLC form the left channel audio output, and XearR and XearRC the right channel audio output. XearLC and XearRC are the ground pins if the output works in a single-ended operation.

In the Pop-Port™ side, HSEAR P and HSEAR N form the left channel output, and HSEAR R P and HSEAR R N the right channel output. Respectively, HSEAR N and HSEAR R N are the ground pins if the output works in a single-ended operation.

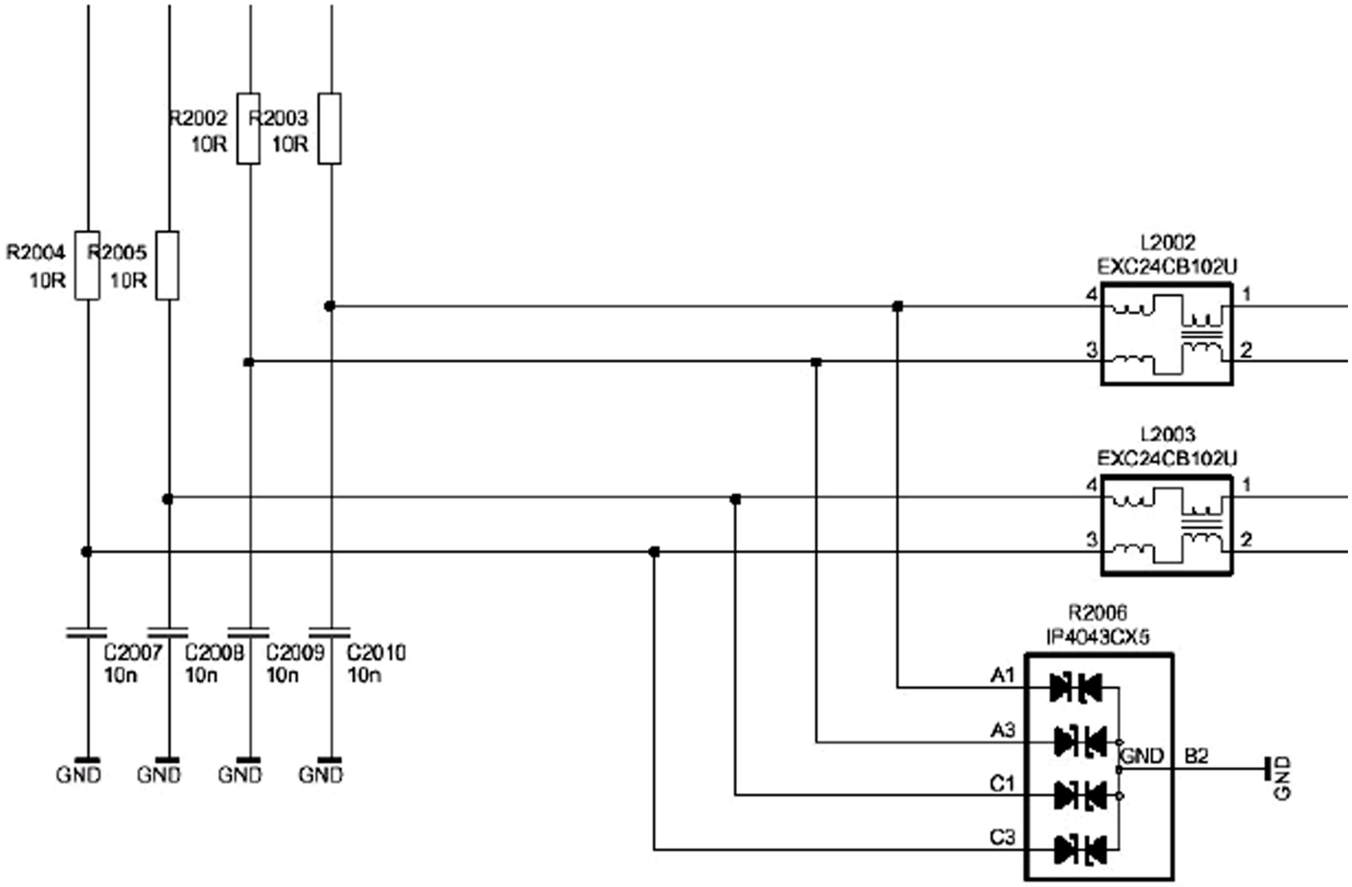

R2002
10R
R2003
10R
R2004
10R
R2005
10R
L2002
EXC24CB102U
4
1
3
2
L2003
EXC24CB102U
4
1
3
2
R2006
IP4043CX5
A1
A3
C1
C3
GND
B2
GND
C2007
10n
C2008
10n
C2009
10n
C2010
10n
GND
GND
GND
GND

Figure 99 External earpiece circuitry (Pop-Port connected on the right)

Vibra circuitry

Vibra is used for vibra-alarm function.

The vibra motor is connected to the Retu ASIC VibraP and VibraN Pulse Width Modulated (PWM) outputs.

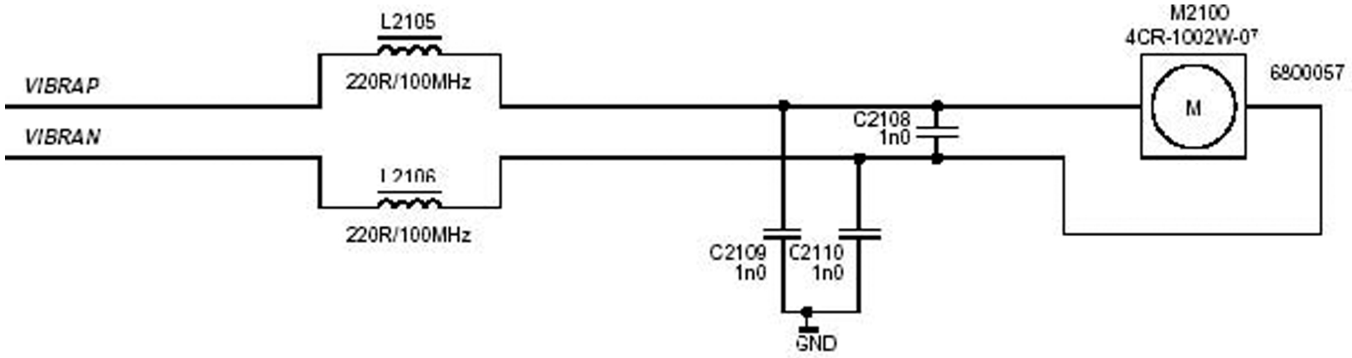

L2105
220R/100MHz
VIBRAP
VIBRAN
L2106
220R/100MHz
C2108
1n0
C2109
1n0
C2110
1n0
GND
M2100
4CR-1002W-07
6800057
M

Figure 100 Vibra circuitry

Pop-port^{TM} connector

Pop-Port^{TM} connector provides a fully differential 4–wire stereo line-level output connection and fully differential 2-wire mono line-level or microphone level input connection.

The handsfree driver in Retu is meant for the headset.

The output is driven in a fully differential mode. In the fully differential mode, the handsfree pin is the negative output and the HFCM pin is the positive output. The gain of the handsfree driver in the differential mode is 6 dB.

The earpiece and headset signals are multiplexed so that the outputs cannot be used simultaneously.

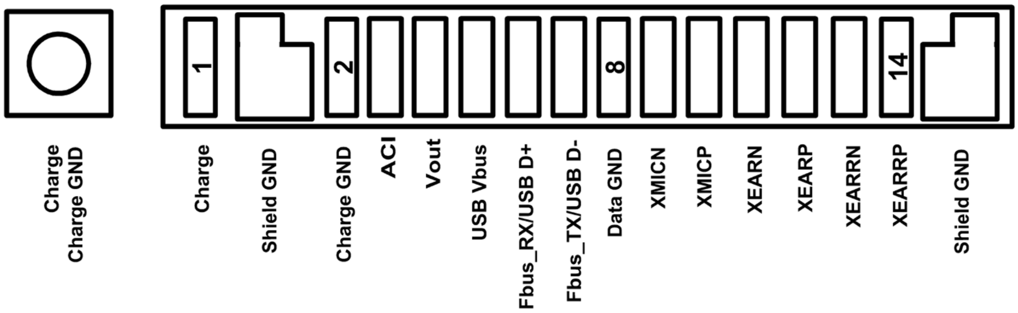

1
2
8
14
Charge
Charge GND
Charge
Shield GND
Charge GND
ACI
Vout
USB Vbus
Fbus_RX/USB D+
Fbus_TX/USB D-
Data GND
XMICN
XMICP
XEARN
XEARP
XEARRN
XEARRP
Shield GND

Figure 101 System connector pin layout

Table 17 Pop-Port^{TM}pin and signal table

Pin #/ Signal name	Signal description	Spectral range	Voltage/ Current levels	Max or nominal serial impedance	Notes
1/ Charge	V Charge	DC	0-9V/ 0.85A		
2/ GND	Charge GND	-	0.85A	100mΩ (PWB+ conn.)	
3/ ACI	ACI	1kbits/s	Digital 0 / 2.5-2.78V	47Ω	Insertion & removal detection
4/ Vout	DC out	DC	2.78V 70 mA 2.5V 90mA	100mΩ (PWB+ conn.)	200mW
5/USB Vbus	USB power		4.375-5.25VDC		115.2kbit

Pin #/ Signal name	Signal description	Spectral range	Voltage/ Current levels	Max or nominal serial impedance	Notes
6/Fbus_RX/USB D+	Data connection				115.2kbit
7/Fbus_TX/USB D+	Data connection				115.2kbit
8/Data GND	USB Ground				115.2kbit
9 / XMIC N	Audio in	300-8k	1Vpp &		
			2.5-2.78VDC		
10 / XMIC P	Audio in	300-8k	1Vpp &		
			2.5-2.78VDC		
11 / XEAR N	Audio out	20-20k	1Vpp	10Ω	
12 / XEAR P	Audio out	20-20k	1Vpp	10Ω	
13 / XEAR R N	Audio out	20-20k	1Vpp	10Ω	Not conn. in mono
14 / XEAR R P	Audio out	20-20k	1Vpp	10Ω	Not conn. in mono

Bluetooth and FM radio

Bluetooth

Bluetooth provides a fully digital link for communication between a master unit (the phone) and one or more slave units (e.g. a wireless headset). The system provides a radio link that offers a high degree of flexibility to support various applications and product scenarios. Data and control interface for a low power RF module is provided by the module.

The Bluetooth is physically integrated with the FM radio into one single module. From a functional point of view they, however, have nothing in common.

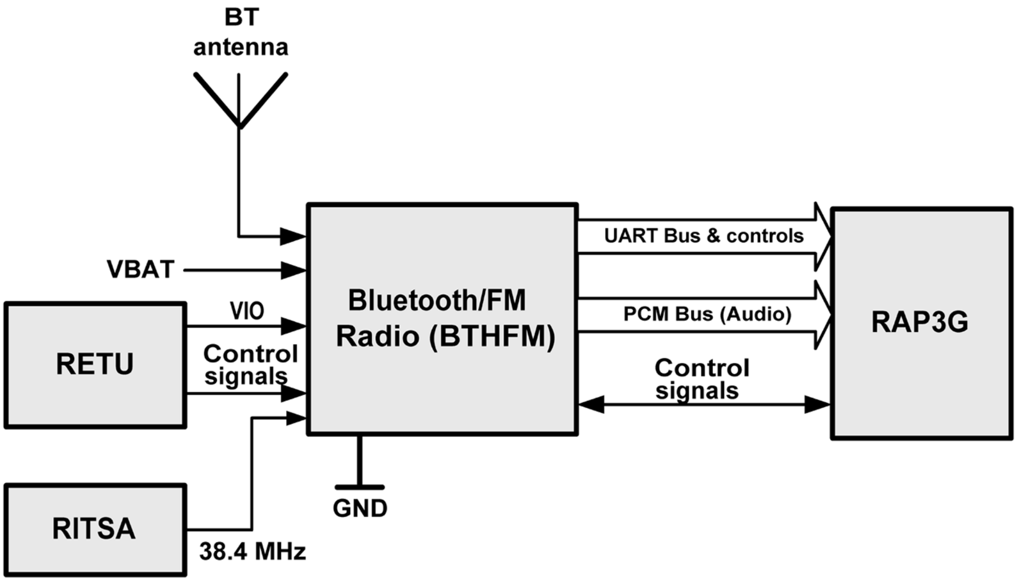

BT
antenna
VBAT
RETU
VIO
Control
signals
RITSA
38.4 MHz
Bluetooth/FM
Radio (BTHFM)
GND
UART Bus & controls
PCM Bus (Audio)
Control
signals
RAP3G

Figure 102 Bluetooth interface

The Bluetooth has a separate built in antenna and is powered by VBAT and the regulated voltage VIO. For audio applications the Bluetooth has a PCM data bus. In addition a UART (universal asynchronous receiver/ transmitter) is used for data communication and controls.

FM radio

The FM radio is physically integrated with the Bluetooth into one single module. From a functional point of view they, however, have nothing in common (for information on Bluetooth, see page (page 9–22)).

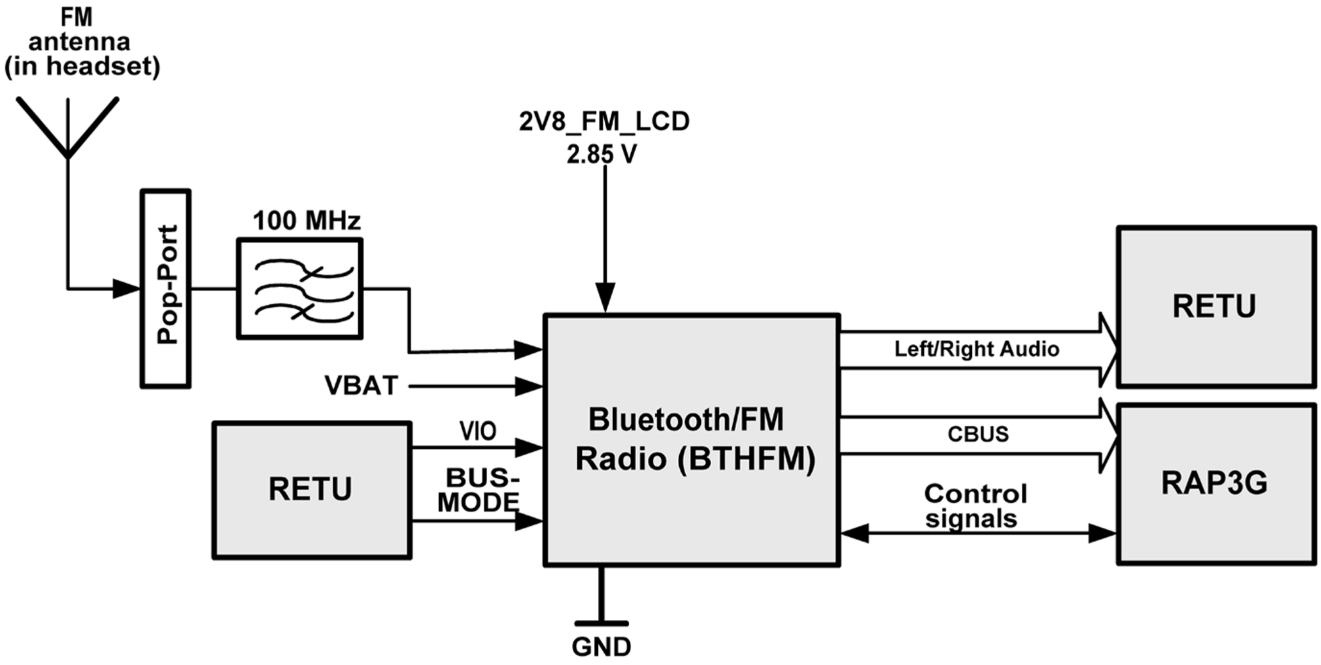

FM
antenna
(in headset)
Pop-Port
100 MHz
2V8_FM_LCD
2.85 V
VBAT
RETU
VIO
BUS-
MODE
Bluetooth/FM
Radio (BTHFM)
GND
Left/Right Audio
CBUS
Control
signals
RETU
RAP3G

Figure 103 FM interface

The FM radio is an integrated circuit, controlled by MCU software through a serial bus interface. The wires of the headset are used as poles of the antenna, and no other antenna is needed for FM radio reception.

In addition to the Bluetooth unit the FM radio is provided with LDO (low drop out) voltage 2V8_FM_LCD.

The radio has an automatic band search function, which can search for a strong write/read signal from a certain frequency. When this is found, data is transmitted to the radio. When the signal strength is low, the RETU can read data, which is available until the signal is strong again.

RF description

Introduction to receiver functionality

Receiver functions are implemented in an RF ASIC.

The receiver is a linear direct conversion receiver consisting of separate front ends (LNA (Low Noise Amplifier) and demodulator) for each supported system. After the demodulators, the signal paths are combined to one common BB path.

WCDMA receiver

In the WCDMA mode, the received signal is fed from the antenna to the duplex filter. After the duplex filter the signal goes via balun to the integrated LNA (Low Noise Amplifier) residing in N7500. After the LNA, the signal goes trough an off chip band pass SAW filter. The main task of the filter is to attenuate the Tx signal which amplified by LNA and is leaking trough the duplex filter.

After filtering, the signal goes to the down conversion mixer, which converts the signal to baseband I and Q signals (90 degrees phase shift). After the demodulator output, there is an RC low pass filter with f0 of ca. 1.5 MHz.

At BB frequency the signal is amplified and fed to a low pass filter.

The Rx channel filter must be calibrated with an automatic routine whenever N7500 IC is changed to a phone.

In the WCDMA mode, the corner frequency of the filter is set to ca. 2.1MHz. The filter is followed by an AGC (Automatic Gain Control) amplifier with an adjustable gain. The signal is further amplified before it is fed to balanced analogue IQ output pins. The analogue output pins are accompanied by reference voltage output, which sets the DC level for the AD converter in BB ASIC RAP3G.

The last stage of the RF Rx chain is an output buffer which feeds the signal and a reference voltage (VREFCM) to the BB ASIC. The AGC stages are used to maintain the voltage swing at the input of the AD converters at an adequate level.

GSM receiver

As GSM900, GSM1800 and GSM1900 Rx branches are functionally identical, the following description is applicable to all of them.

The received signal goes from the GSM antenna to the antenna switch module. The antenna switch module contains PIN diode switches for a band and Rx/Tx selection and also Rx SAW filters.

The antenna switch module is followed by integrated LNAs residing in N7500.

The LNAs are followed by demodulators which downconvert the signal to baseband I and Q signals.

After the down conversion mixer, the Rx chain is similar to the WCDMA Rx. The channel select filter is set to 115 kHz in the GSM mode.

Introduction to transmitter functionality

Transmitter functions are implemented in an RF ASIC. The ASIC contains a BB frequency low pass filter, which is tunable according to the signal bandwidth of the system in use.

In addition, the ASIC contains separate RF paths comprising a final frequency IQ modulator and VGA amplifiers.

WCDMA transmitter functionality

In the transmitter side, an analogue I/Q modulated signal is received from digital baseband into an RF ASIC and feed through a low pass filter. The corner frequency of the filter is set to approximately 3 MHz. After the filter the signal is feed to the IQ modulator, which converts the signal to final Tx frequency. There are two separate I/Q modulators: one for WCDMA and another for GSM signals. The modulator is followed by two VGA stages giving 85 dB of gain control range. The signal then exits the RF ASIC via a balanced line. Next, the signal is band pass filtered by a SAW filter before it is fed to the WCDMA PA module. After the PA, the transmitted WCDMA signal is fed through an isolator and a duplex filter to the antenna.

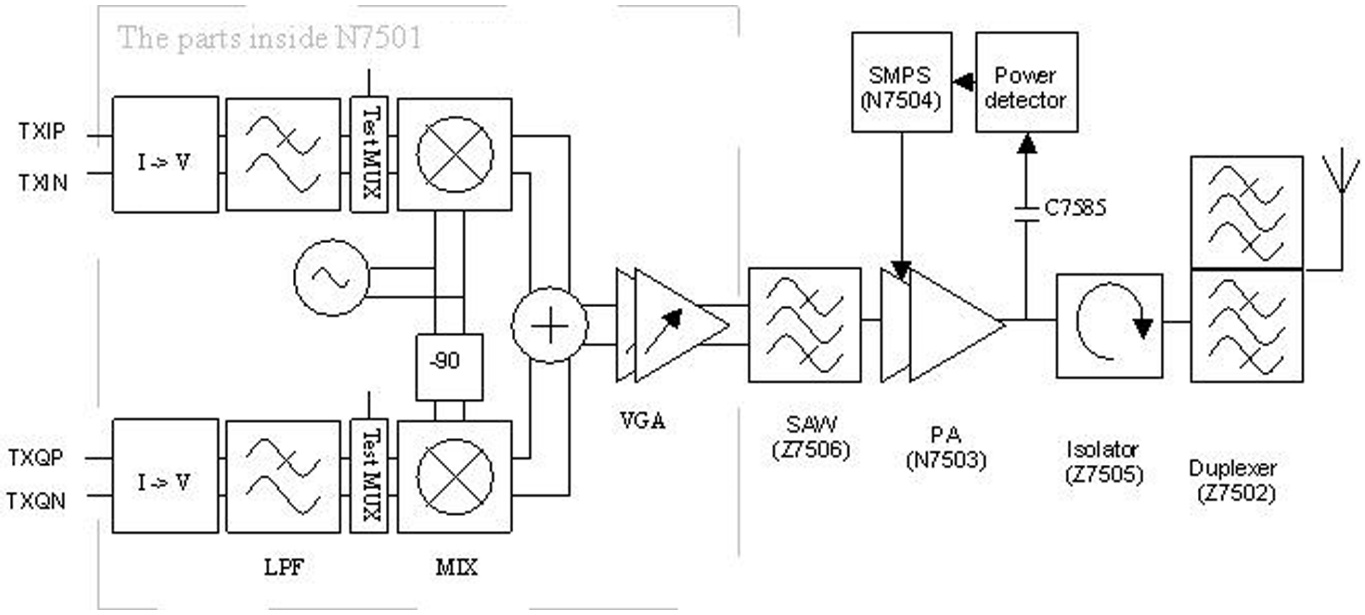


Figure 104 WCDMA transmitter

WCDMA power control

WCDMA Tx power control is accomplished by the two VGA amplifier stages in the Tx ASIC.

The VGAs have a common temperature compensation circuit and one voltage mode analogue input for gain control (TXC).

The gain of the VGA amplifier chain is controlled by a DA converter in BB. The same DA converter is shared by GSM Tx power control function.

A sample of the output power is taken by a capacitor between the power amplifier and the isolator, and fed to a diode power detector. The output of the detector is low pass filtered, and the voltage is then AD converted in BB.

Another function of the detector voltage is to steer the DC/DC converter, which is providing a variable supply voltage for the WCDMA PA.

WCDMA PA module

The WCDMA PA is housed in a separate module having:

- a variable supply voltage input for the amplifier stages (Vcc11),
- a battery supply voltage for the bias circuits (Vcc12),
- and two bias current inputs.

Bias currents are generated by 5-bit DA converters in the RF ASIC. The converters are controlled by BB via RFBus.

If a different manufacturer's PA is changed to the phone, this setting must be set again.

The bias currents are also used as PA on/off controls. The structure of the WCDMA PA is shown in the following figure. The supply voltage for the output stage is got from a DC/DC converter in order to improve the efficiency at low power levels.

PA DC/DC converter

The control of the DC/DC converter is fed back from the power detector circuit.

The DC/DC converter limits the lowest supply voltage to 1.5 V. At highest power levels the DC/DC converter output settles nominally to 3.2 V.

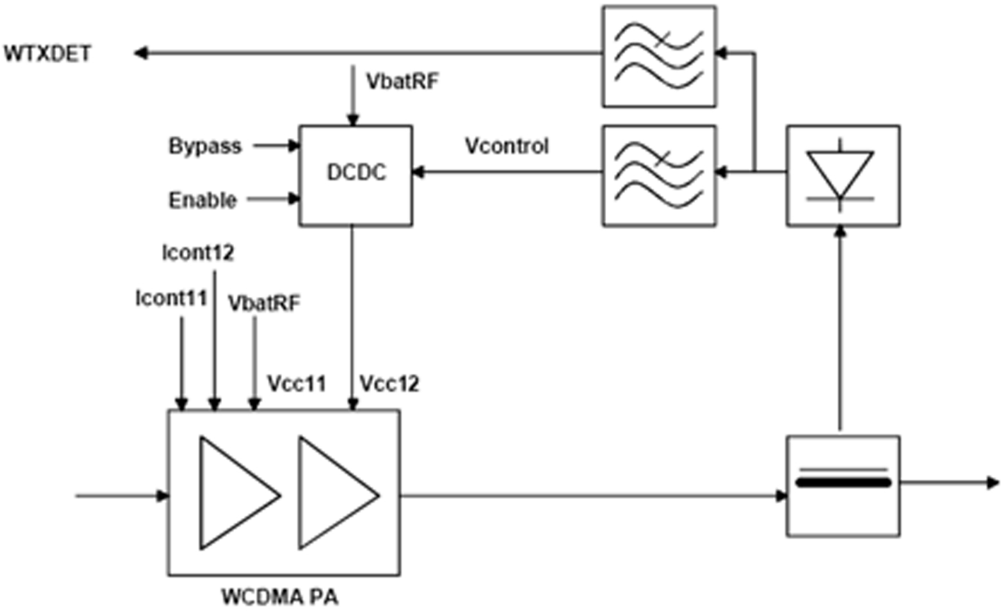


Figure 105 Block diagram of DC/DC converter and WCDMA PA

GSM transmitter functionality

An RF ASIC receives an analogue IQ modulated signal from digital BB, which is first low pass filtered with filter corner frequency set to approximately 200 kHz. After the filter, the signal is routed to the GSM modulator. The amplifier gives 40 dB of power control dynamic range.

After the VGA stage the signal exits the RF ASIC. In case of GSM1800/1900 the signal goes directly to the GSM PA module. In case of EGSM900 (and GSM850), the PA module is preceded by a SAW filter. After the filter, the signal is fed to the GSM PA module. Finally, the signal is routed via the antenna switch to the antenna.

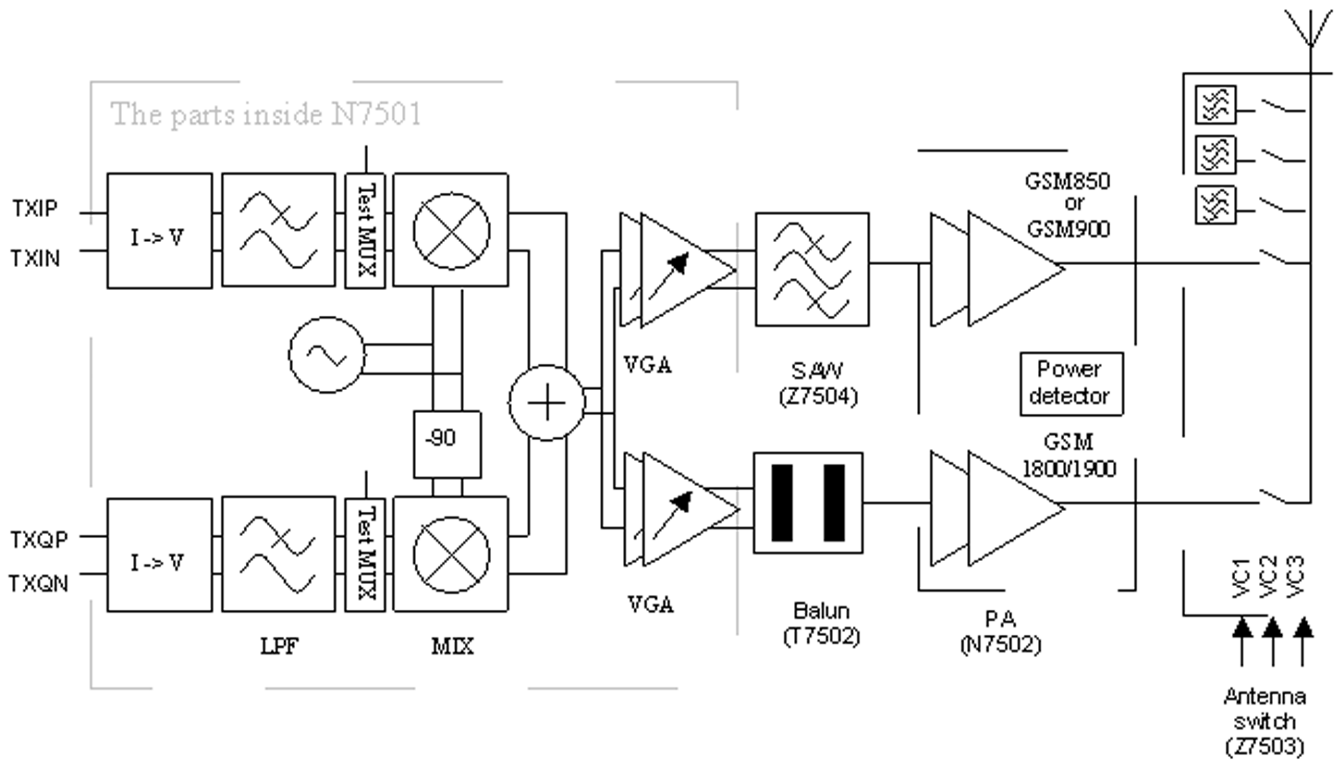

The parts inside N7501
TXIP
TXIN
TXQP
TXQN
I -> V
I -> V
Test MUX
Test MUX
-90
LPF
MIX
VGA
VGA
SAW
(Z7504)
Balun
(T7502)
GSM850
or
GSM900
Power
detector
GSM
1800/1900
PA
(N7502)
VC1
VC2
VC3
Antenna
switch
(Z7503)

Figure 106 GSM transmitter

GSM power control

A closed control loop comprise an integrated power detector (in PA module) and an error amplifier. The error amplifier resides in N7501, and it controls the transmitter power of GSM.

Detector output from the PA gives a DC level proportional to the output power. The DC voltage is fed to the negative input of the error amplifier, where it is compared to the level of the reference signal, TXC. TXC is got from the BB circuitry. The output of the error amplifier is fed to a buffer amplifier, which in turn steers the VGA amplifier.

The power control loop is enabled and disabled by writing an appropriate register in N7501 RF ASIC. In case of dual slot transmission, the output power is ramped down between the consecutive slots.

GSM PA module

A single GSM/EDGE PA module contains two separate amplifier chains, one for EGSM900 (and GSM850) and another for GSM1800/1900. Both amplifiers have a battery supply connection and two bias current inputs.

Frequency synthesizers

RF has separate synthesizers for Rx and Tx. Both synthesizers consist of:

- PLL (Phase-Locked Loop)
- loop filter
- VCO (Voltage Controlled Oscillator)
- balun

The VCO frequencies are locked by PLLs into a reference oscillator, VCTCXO (Voltage Controlled Temperature Compensated Crystal Oscillator).

The PLLs are located in RF ASICs and controlled via RFBus.

The VCOs operate at the channel frequency multiplied by two in the upper bands and by four in EGSM900 (and GSM850, if applicable). The required frequency dividers required for modulators and demodulators are integrated into RF ASICs. The dividers are controlled via RFBus.

Reference oscillators

A 38.4MHz VCTCXO is used as a reference oscillator for the frequency synthesizers.

The output signal of the VCTCXO is directly connected to both RF ASICs where it is used as synthesizer reference. The other RF ASIC also contains a balanced buffered output for supplying the clock signal to the digital BB ASIC and a single ended buffer for Bluetooth.

The frequency of the reference oscillator is locked into the frequency of the base station with the help of an AFC (Automatic Frequency Control) voltage, which is generated in BB by a DSP (Digital Signal Processor) and converted by a dedicated DAC (Digital-to-Analogue-Converter).

Regulators

RF ASICs contain integrated regulators to supply regulated voltages for their internal circuitry and other RF parts. Rx VCO supply is got via a switch from an RF ASIC VR1 regulator. VCO can be switched on and off by controlling the switch via RFBus.

Supply voltage for the VCTCXO is provided by a BB mixed mode ASIC. The same supply is used for reference clock input buffers, output buffers and for the digital control blocks of both RF ASICs.

Other supplies, like 4.7 V supply for PLL charge pumps and bias reference (VREFRF01) are also provided by the BB mixed mode ASIC.

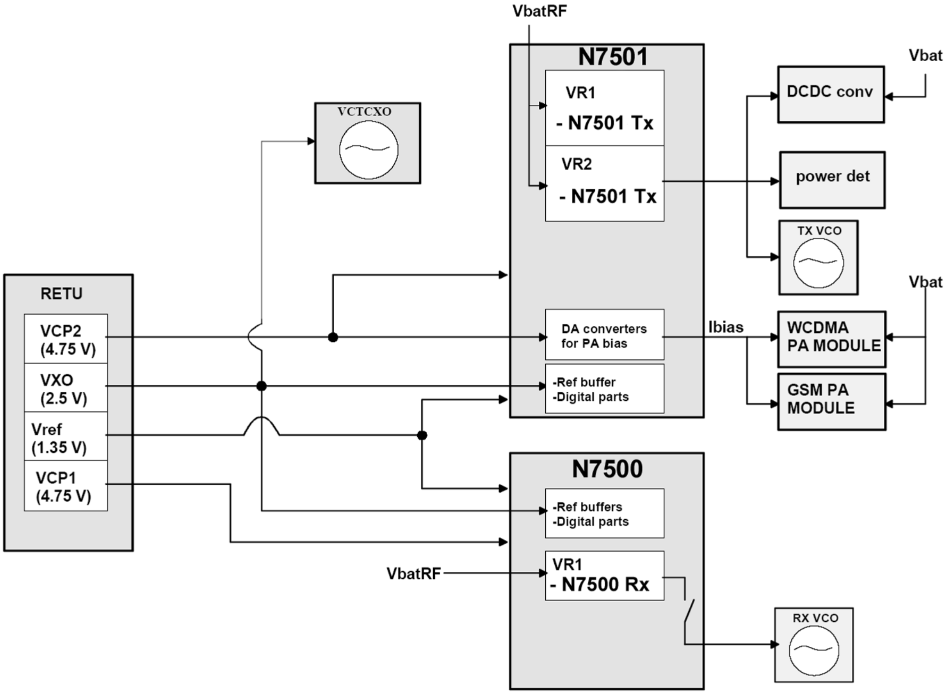

VbatRF
N7501
VR1
- N7501 Tx
VR2
- N7501 Tx
VCTCXO
Vbat
DCDC conv
power det
TX VCO
Vbat
RETU
VCP2
(4.75 V)
VXO
(2.5 V)
Vref
(1.35 V)
VCP1
(4.75 V)
DA converters
for PA bias
Ibias
WCDMA
PA MODULE
-Ref buffer
-Digital parts
GSM PA
MODULE
N7500
-Ref buffers
-Digital parts
VbatRF
VR1
- N7500 Rx
RX VCO

Figure 107 RF supply connections from the BB mixed mode ASIC

10 — Schematics

(This page left intentionally blank.)

Table of Contents

Schematics....................................10–4

List of Figures

Figure 108 RM-78, 1mda_05a: System connector....................................10–4
Figure 109 RM-78, 1mda_05a: Retu....................................10–5
Figure 110 RM-78, 1mda_05a: Tahvo....................................10–6
Figure 111 RM-78, 1mda_05a: RAP3G, memories, mini SD card....................................10–7
Figure 112 RM-78, 1mda_05a: Camera, B&B connectors, keyboard....................................10–8
Figure 113 RM-78, 1mda_05a: FM & BT module....................................10–9
Figure 114 RM-78, 1mda_05a: RF-part....................................10–10
Figure 115 RM-78, 1mda_05a: Signal overview....................................10–11
Figure 116 RM-78, 1mda_05a: Component finder....................................10–12

Schematics

System connector

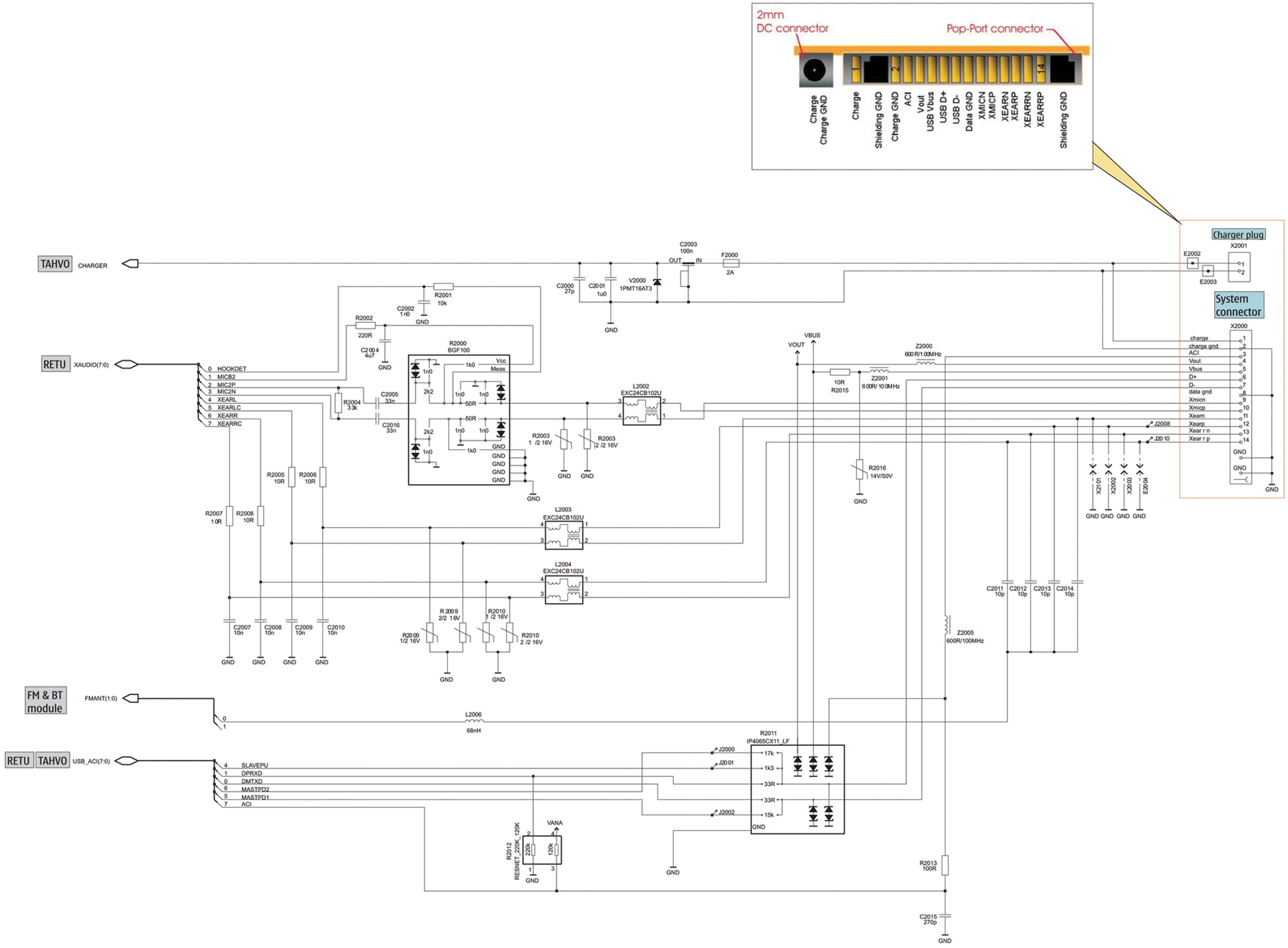

2mm
DC connector
Pop-Port connector
Charge
Charge GND
1
Charge
Shielding GND
2
Charge GND
ACI
Vout
USB Vbus
USB D+
USB D-
Data GND
XMICN
XMICP
XEARN
XEARP
XEARRN
14
XEARRP
Shielding GND
Charger plug
X2001
E2002
E2003
System connector
X2000
charge
charge gnd
ACI
Vout
Vbus
D+
D-
data gnd
Xmicn
Xmicp
Xearn
Xearp
Xear r n
Xear r p
GND
J2008
J2010
TAHVO
CHARGER
C2000 27p
C2001 1u0
V2000 1PMT16AT3
C2003 100n
OUT
IN
F2000 2A
R2001 10k
C2002 1n0
R2002 220R
C2004 4u7
RETU
XAUDIO(7:0)
0 HOOKDET
1 MICB2
2 MIC2P
3 MIC2N
4 XEARL
5 XEARLC
6 XEARR
7 XEARRC
R2004 33k
C2005 33n
C2016 33n
R2000 BGF100
Vcc
Meas
1k0
1n0
2k2
50R
R2003 1 /2 16V
R2003 2 /2 16V
L2002 EXC24CB102U
VOUT
VBUS
R2015 10R
Z2001 600R/100MHz
Z2000 600R/100MHz
R2016 14V/50V
X2101
X2002
X2003
E2004
R2005 10R
R2006 10R
R2007 10R
R2008 10R
L2003 EXC24CB102U
L2004 EXC24CB102U
C2007 10n
C2008 10n
C2009 10n
C2010 10n
R2009 2/2 16V
R2009 1/2 16V
R2010 1 /2 16V
R2010 2 /2 16V
C2011 10p
C2012 10p
C2013 10p
C2014 10p
Z2005 600R/100MHz
FM & BT module
FMANT(1:0)
L2006 68nH
RETU
TAHVO
USB_ACI(7:0)
4 SLAVEPU
1 DPRXD
0 DMTXD
6 MASTPD2
5 MASTPD1
7 ACI
R2011 IP4065CX11_LF
J2000
J2001
J2002
17k
1k3
33R
33R
15k
VANA
R2012 RESNET_220K_120K
220k
120k
R2013 100R
C2015 270p

Figure 108 RM-78, 1mda_03a: System connector

Retu

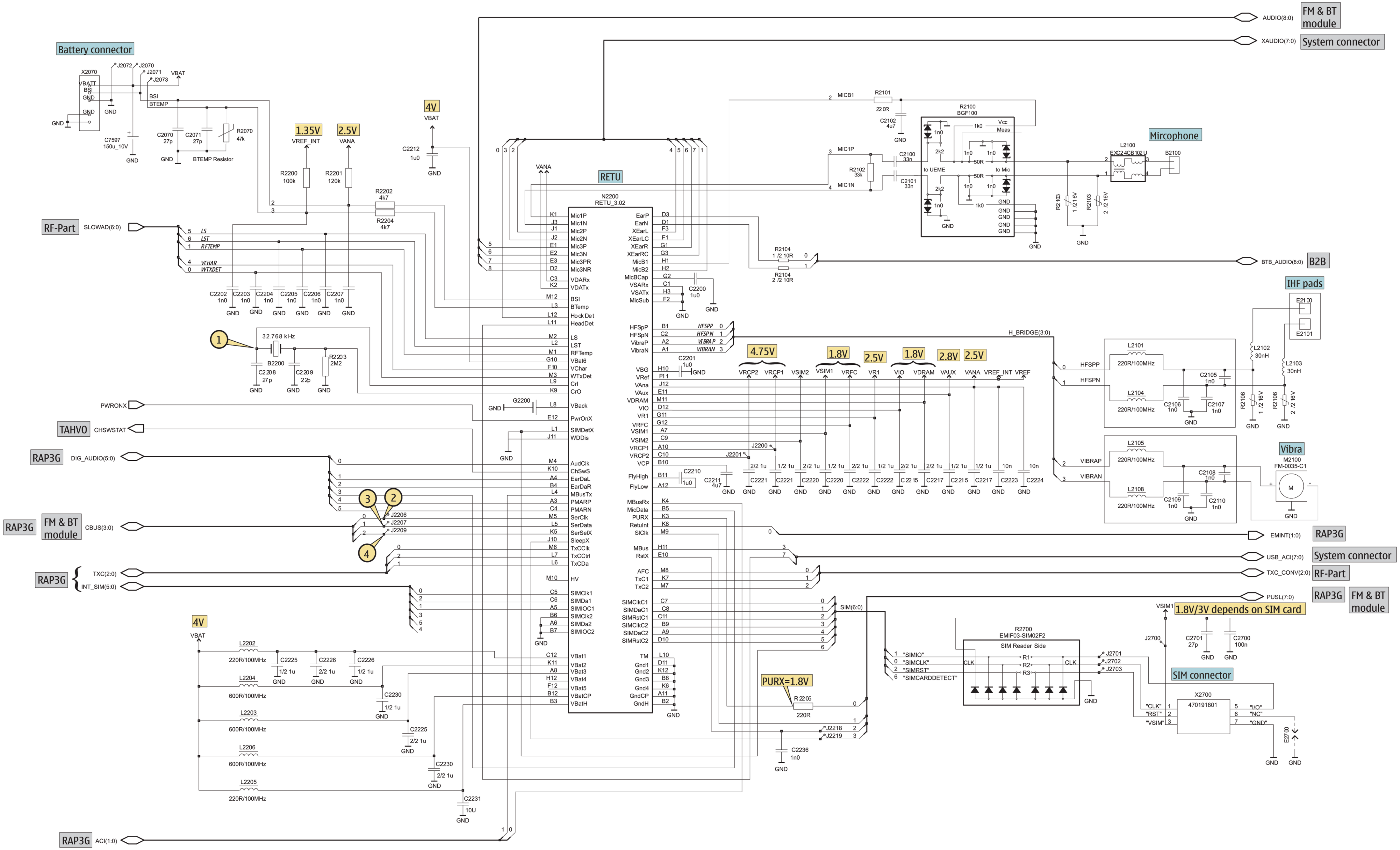

FM & BT module
AUDIO(8:0)
XAUDIO(7:0)
System connector
Battery connector
X2070
VBATT
BSI
GND
J2072
J2070
J2071
J2073
VBAT
BTEMP
C7597 150u_10V
C2070 27p
C2071 27p
R2070 47k
BTEMP Resistor
1.35V
VREF_INT
2.5V
VANA
4V
VBAT
C2212 1u0
R2200 100k
R2201 120k
R2202 4k7
R2204 4k7
RETU
N2200 RETU_3.02
RF-Part
SLOWAD(6:0)
C2202 1n0
C2203 1n0
C2204 1n0
C2205 1n0
C2206 1n0
C2207 1n0
32.768 kHz
B2200
C2208 27p
C2209 22p
R2203 2M2
G2200
PWRONX
TAHVO
CHSWSTAT
RAP3G
DIG_AUDIO(5:0)
CBUS(3:0)
TXC(2:0)
INT_SIM(5:0)
ACI(1:0)
J2206
J2207
J2209
L2202 220R/100MHz
L2204 600R/100MHz
L2203 600R/100MHz
L2206 600R/100MHz
L2205 220R/100MHz
C2225 2/2 1u
C2226 2/2 1u
C2230 1/2 1u
C2231 10U
MICB1
R2101 220R
C2102 4u7
R2100 BGF100
MIC1P
MIC1N
R2102 33k
C2100 33n
C2101 33n
to UEME
to Mic
Mircophone
L2100 EXC24CB102U
B2100
R2103
R2104 1/2 10R
R2104 2/2 10R
BTB_AUDIO(8:0)
B2B
IHF pads
E2100
E2101
H_BRIDGE(3:0)
HFSPP
HFSPN
L2101 220R/100MHz
L2104 220R/100MHz
C2105 1n0
C2106 1n0
C2107 1n0
L2102 30nH
L2103 30nH
R2106
4.75V
1.8V
2.5V
1.8V
2.8V
2.5V
VRCP2
VRCP1
VSIM2
VSIM1
VRFC
VR1
VIO
VDRAM
VAUX
VANA
VREF_INT
VREF
C2200 1u0
C2201 1u0
C2210 1u0
C2211 4u7
J2200
J2201
C2221
C2220
C2222
C2215
C2217
C2223
C2224
Vibra
M2100 FM-0035-C1
VIBRAP
VIBRAN
L2105 220R/100MHz
L2108 220R/100MHz
C2108 1n0
C2109 1n0
C2110 1n0
EMINT(1:0)
USB_ACI(7:0)
TXC_CONV(2:0)
PUSL(7:0)
SIM(6:0)
VSIM1
1.8V/3V depends on SIM card
R2700 EMIF03-SIM02F2
SIM Reader Side
"SIMIO"
"SIMCLK"
"SIMRST"
"SIMCARDDETECT"
J2700
J2701
J2702
J2703
C2701 27p
C2700 100n
SIM connector
X2700 470191801
"CLK"
"RST"
"VSIM"
"I/O"
"NC"
"GND"
E2700
PURX=1.8V
R2205 220R
C2236 1n0
J2218
J2219
GND
1
2
3
4

Figure 109 RM-78, 1mda_05a: Retu

Tahvo

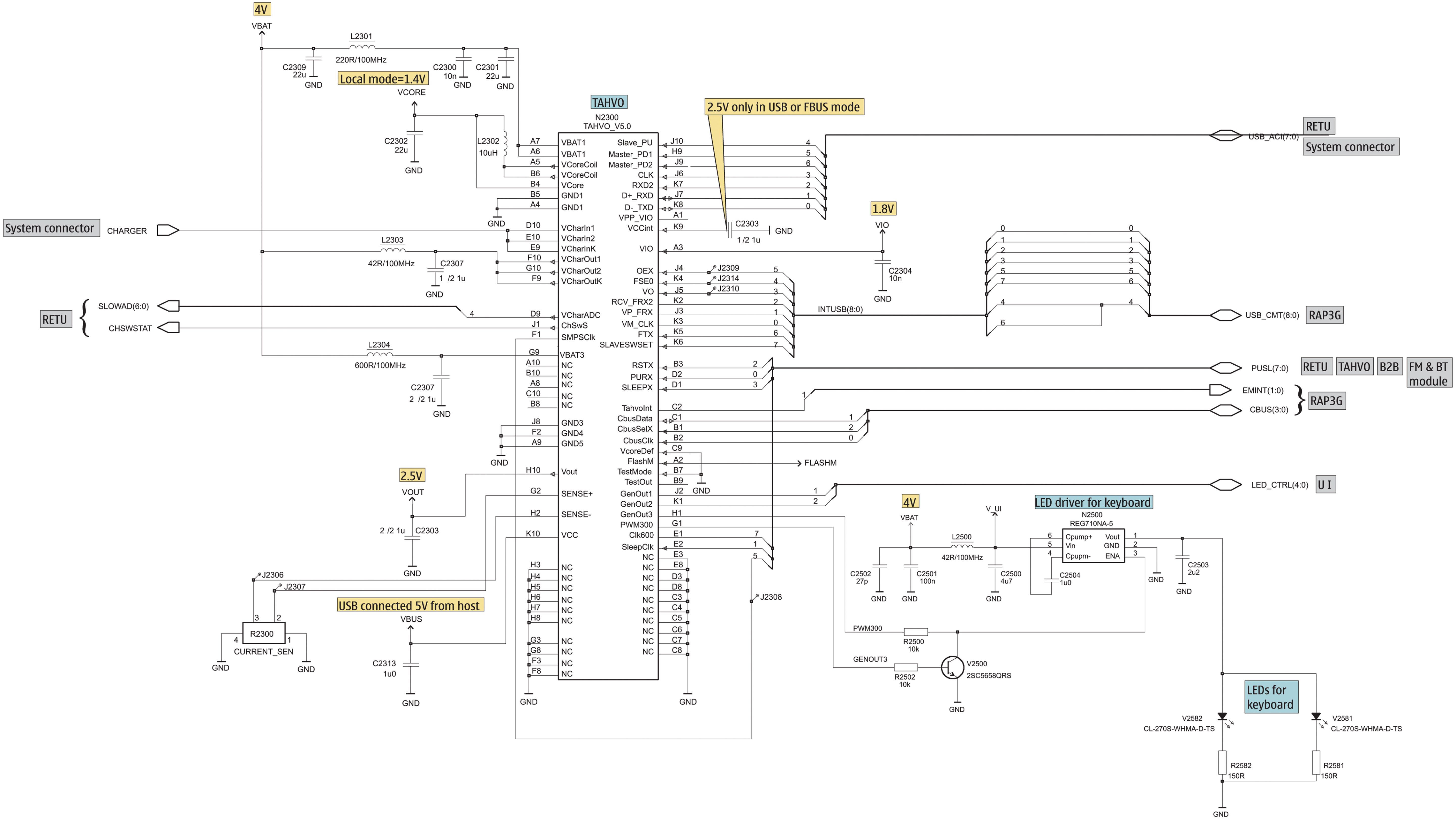

4V
VBAT
L2301
220R/100MHz
C2309
22u
GND
Local mode=1.4V
VCORE
C2300
10n
C2301
22u
C2302
22u
L2302
10uH
TAHVO
N2300
TAHVO_V5.0
2.5V only in USB or FBUS mode
RETU
System connector
USB_ACI(7:0)
System connector
CHARGER
L2303
42R/100MHz
C2307
1 /2 1u
RETU
SLOWAD(6:0)
CHSWSTAT
L2304
600R/100MHz
C2307
2 /2 1u
VBAT1
VBAT1
VCoreCoil
VCoreCoil
VCore
GND1
GND1
VCharIn1
VCharIn2
VCharInK
VCharOut1
VCharOut2
VCharOutK
VChargADC
ChSwS
SMPSClk
VBAT3
NC
GND3
GND4
GND5
Vout
SENSE+
SENSE-
VCC
Slave_PU
Master_PD1
Master_PD2
CLK
RXD2
D+_RXD
D-_TXD
VPP_VIO
VCCint
VIO
OEX
FSE0
VO
RCV_FRX2
VP_FRX
VM_CLK
FTX
SLAVESWSET
RSTX
PURX
SLEEPX
TahvoInt
CbusData
CbusSelX
CbusClk
VcoreDef
FlashM
TestMode
TestOut
GenOut1
GenOut2
GenOut3
PWM300
Clk600
SleepClk
C2303
1 /2 1u
1.8V
VIO
C2304
10n
J2309
J2314
J2310
INTUSB(8:0)
USB_CMT(8:0)
RAP3G
PUSL(7:0)
RETU
TAHVO
B2B
FM & BT module
EMINT(1:0)
CBUS(3:0)
RAP3G
FLASHM
LED_CTRL(4:0)
U I
2.5V
VOUT
2 /2 1u
C2303
J2306
J2307
R2300
CURRENT_SEN
USB connected 5V from host
VBUS
C2313
1u0
J2308
4V
VBAT
V_UI
L2500
42R/100MHz
LED driver for keyboard
N2500
REG710NA-5
Cpump+
Vin
Cpupm-
Vout
GND
ENA
C2502
27p
C2501
100n
C2500
4u7
C2504
1u0
C2503
2u2
PWM300
R2500
10k
GENOUT3
R2502
10k
V2500
2SC5658QRS
LEDs for keyboard
V2582
CL-270S-WHMA-D-TS
V2581
CL-270S-WHMA-D-TS
R2582
150R
R2581
150R
GND

Figure 110 RM-78, 1mda_05a: Tahvo

RAP3G, memories, mini SD card

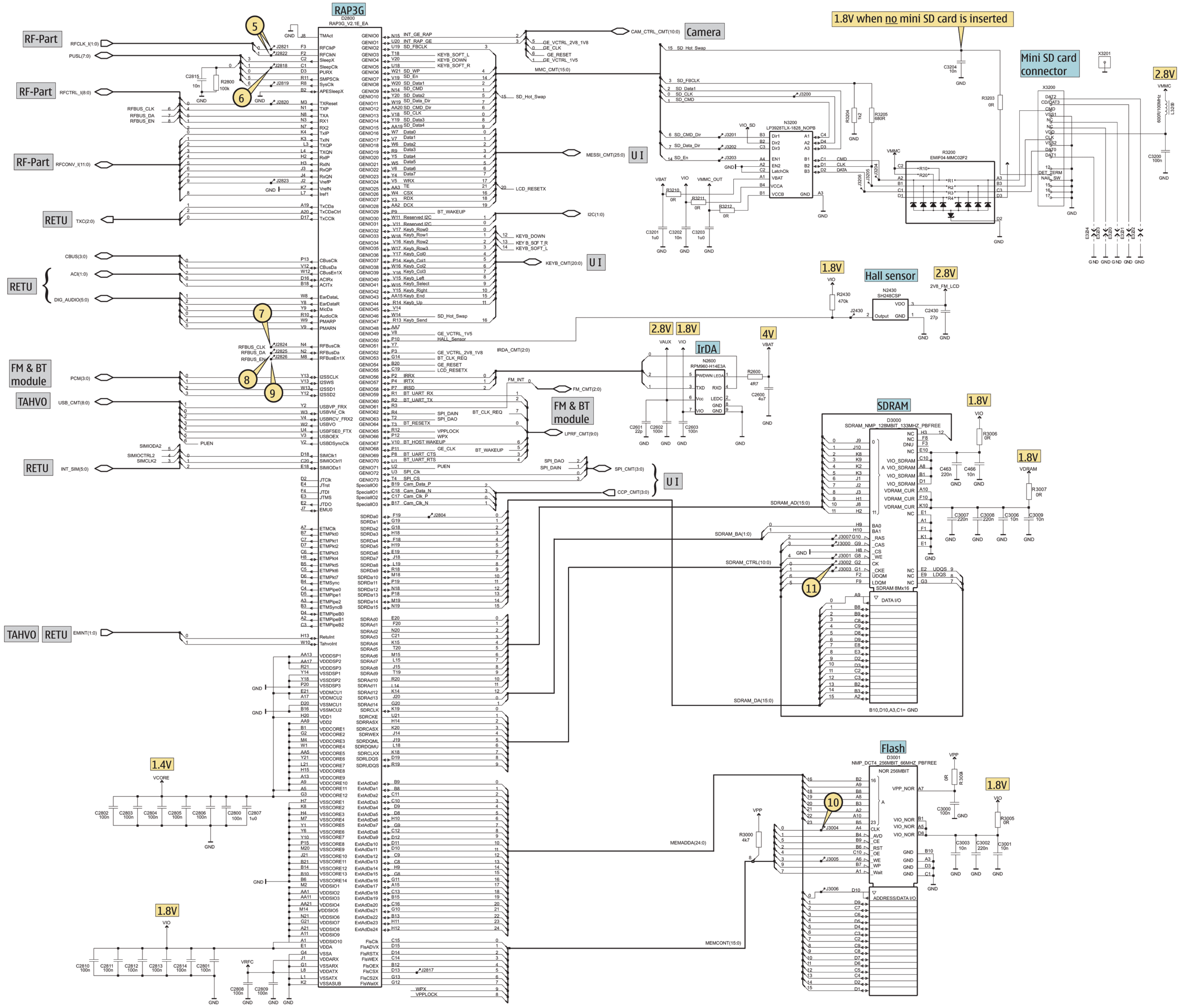

RAP3G
D2800
RAP3G_V2.1E_EA
RF-Part
RF-Part
RF-Part
RETU
RETU
FM & BT
module
TAHVO
RETU
TAHVO
RETU
5
6
7
8
9
10
11
Camera
1.8V when no mini SD card is inserted
Mini SD card
connector
2.8V
U I
U I
1.8V
Hall sensor
2.8V
2.8V
1.8V
IrDA
4V
FM & BT
module
SDRAM
1.8V
1.8V
U I
Flash
1.8V
1.4V
1.8V

Figure 111 RM-78, 1mda_05a: RAP3G, memories, mini SD card

Camera, B&B connectors, keyboard

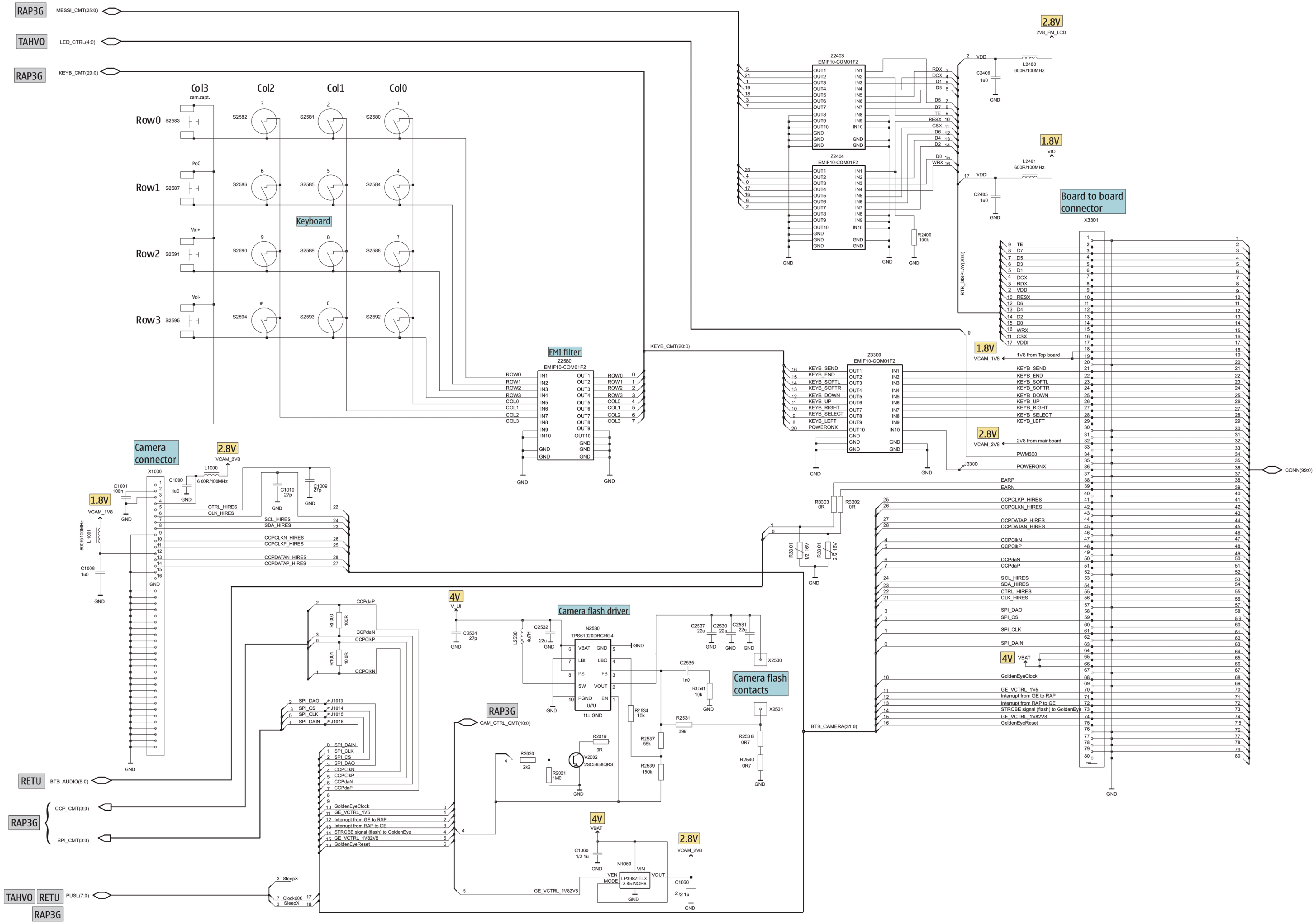

RAP3G
MESSI_CMT(25:0)
TAHVO
LED_CTRL(4:0)
KEYB_CMT(20:0)
Col3
cam.capt.
Col2
Col1
Col0
Row0
Row1
Row2
Row3
PoC
Vol+
Vol-
Keyboard
S2580
S2581
S2582
S2583
S2584
S2585
S2586
S2587
S2588
S2589
S2590
S2591
S2592
S2593
S2594
S2595
EMI filter
Z2580
EMIF10-COM01F2
Z2403
Z2404
Z3300
2.8V
2V8_FM_LCD
1.8V
VIO
L2400
600R/100MHz
L2401
C2406
C2405
R2400
100k
Board to board connector
X3301
BTB_DISPLAY(20:0)
VCAM_1V8
1V8 from Top board
VCAM_2V8
2V8 from mainboard
PWM300
POWERONX
J3300
CONN(99:0)
Camera connector
X1000
VCAM_2V8
L1000
C1000
C1001
C1008
C1009
C1010
4V
V_UI
C2534
Camera flash driver
N2530
TPS61020DRCRG4
L2530
C2532
C2535
C2537
C2530
C2531
X2530
X2531
Camera flash contacts
R2534
R2541
R2531
R2537
R2538
R2539
R2540
R2019
R2020
R2021
V2002
2SC5658QRS
RAP3G
CAM_CTRL_CMT(10:0)
BTB_CAMERA(31:0)
4V
VBAT
C1060
N1060
LP3987ITLX-2.85-NOPB
2.8V
VCAM_2V8
GE_VCTRL_1V82V8
RETU
BTB_AUDIO(8:0)
CCP_CMT(3:0)
SPI_CMT(3:0)
TAHVO
RETU
RAP3G
PUSL(7:0)
SleepX
Clock600
GND

Figure 112 RM-78, 1mda_05a: Camera, B&B connectors, keyboard

FM & BT module

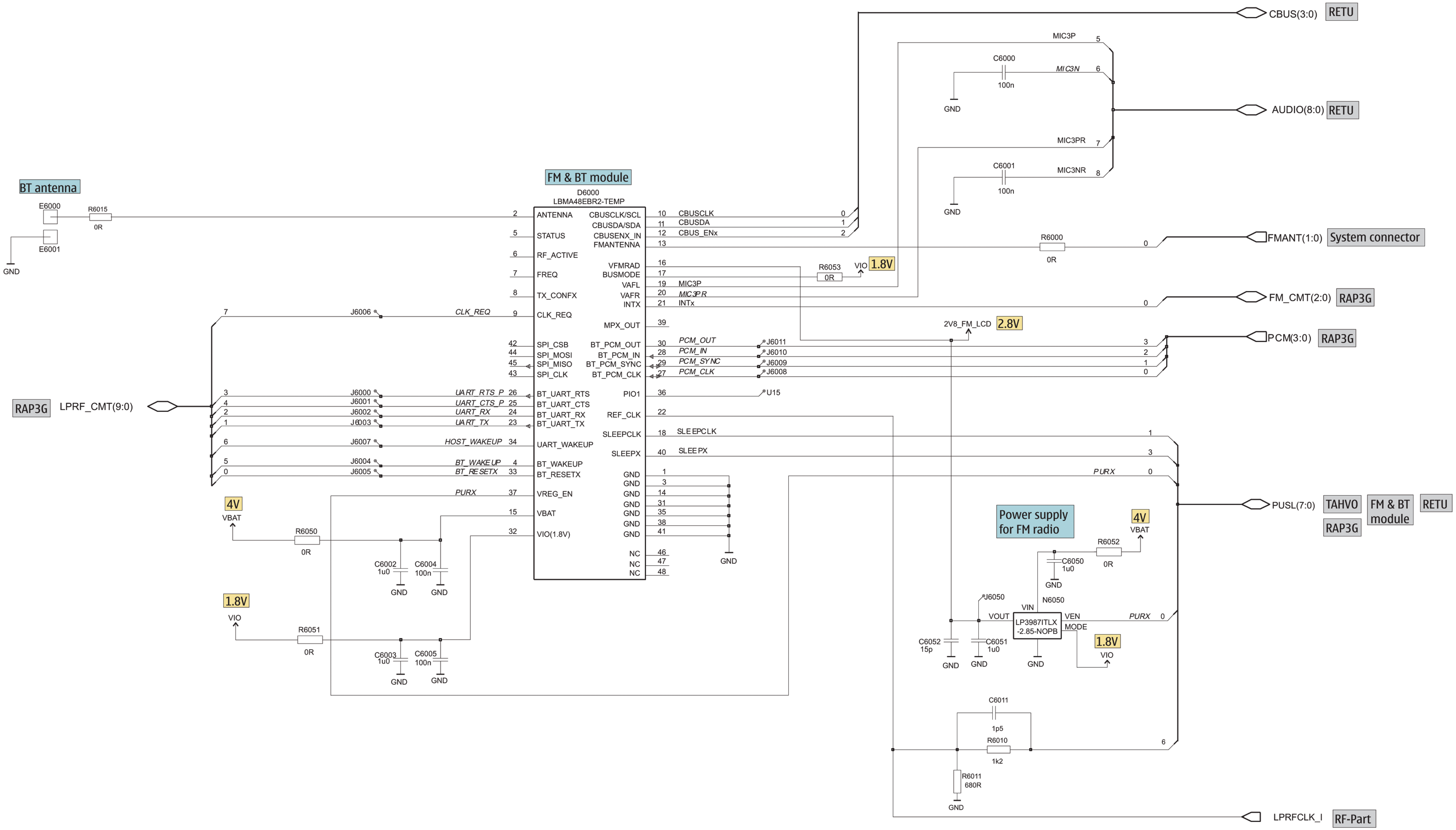
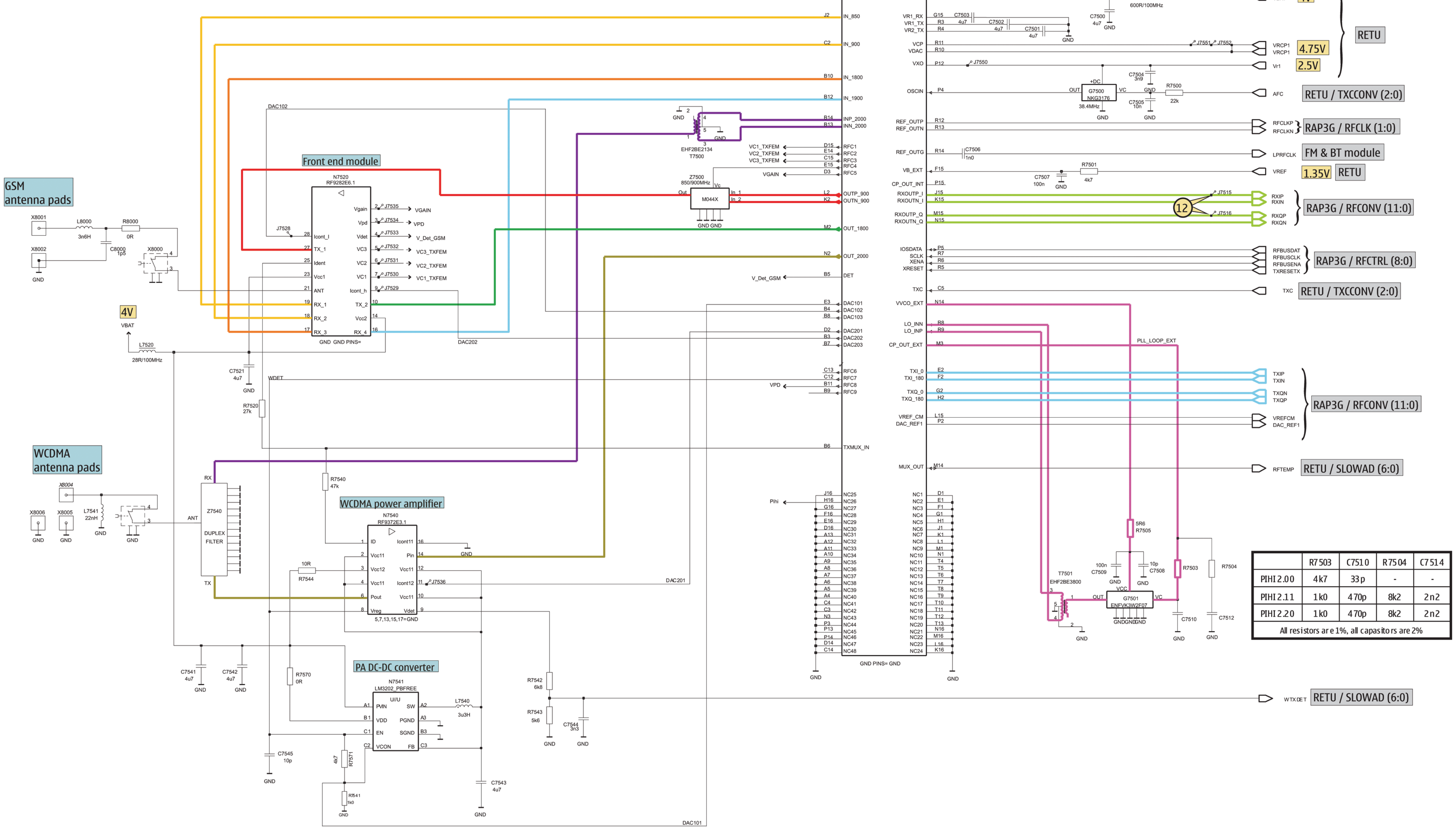

CBUS(3:0)
RETU
MIC3P
C6000
MIC3N
100n
GND
AUDIO(8:0)
RETU
MIC3PR
C6001
MIC3NR
100n
GND
BT antenna
E6000
R6015
0R
E6001
GND
FM & BT module
D6000
LBMA48EBR2-TEMP
ANTENNA
STATUS
RF_ACTIVE
FREQ
TX_CONFX
CLK_REQ
SPI_CSB
SPI_MOSI
SPI_MISO
SPI_CLK
BT_UART_RTS
BT_UART_CTS
BT_UART_RX
BT_UART_TX
UART_WAKEUP
BT_WAKEUP
BT_RESETX
VREG_EN
VBAT
VIO(1.8V)
CBUSCLK/SCL
CBUSDA/SDA
CBUSENX_IN
FMANTENNA
VFMRAD
BUSMODE
VAFL
VAFR
INTX
MPX_OUT
BT_PCM_OUT
BT_PCM_IN
BT_PCM_SYNC
BT_PCM_CLK
PIO1
REF_CLK
SLEEPCLK
SLEEPX
GND
NC
CBUSCLK
CBUSDA
CBUS_ENx
R6000
0R
FMANT(1:0)
System connector
R6053
0R
VIO
1.8V
MIC3P
MIC3PR
INTx
FM_CMT(2:0)
RAP3G
2V8_FM_LCD
2.8V
PCM_OUT
PCM_IN
PCM_SYNC
PCM_CLK
J6011
J6010
J6009
J6008
PCM(3:0)
RAP3G
U15
SLEEPCLK
SLEEPX
PURX
PUSL(7:0)
TAHVO
FM & BT module
RETU
RAP3G
J6006
CLK_REQ
J6000
J6001
J6002
J6003
J6007
J6004
J6005
UART_RTS_P
UART_CTS_P
UART_RX
UART_TX
HOST_WAKEUP
BT_WAKEUP
BT_RESETX
PURX
RAP3G
LPRF_CMT(9:0)
4V
VBAT
R6050
0R
C6002
1u0
C6004
100n
GND
1.8V
VIO
R6051
0R
C6003
1u0
C6005
100n
GND
Power supply for FM radio
4V
VBAT
R6052
0R
C6050
1u0
GND
J6050
N6050
VIN
VOUT
LP3987ITLX-2.85-NOPB
VEN
MODE
PURX
1.8V
VIO
C6052
15p
C6051
1u0
GND
C6011
1p5
R6010
1k2
R6011
680R
GND
LPRFCLK_I
RF-Part

Figure 113 RM-78, 1mda_05a: FM & BT module

RF-part

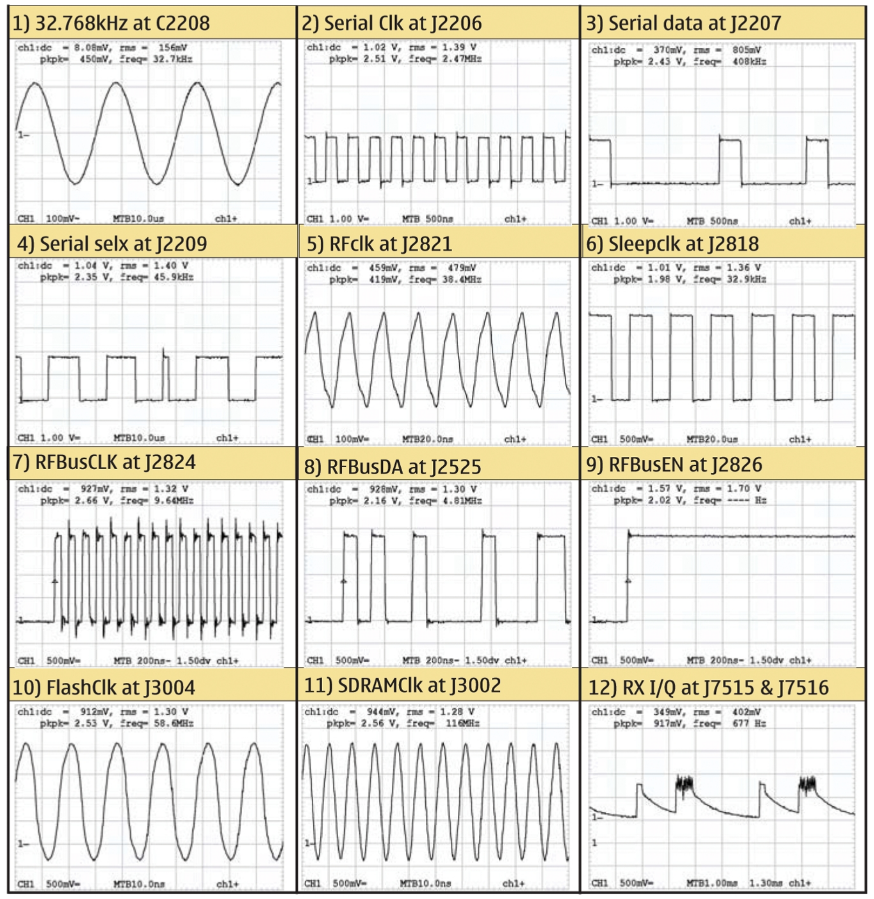
Band	Channel	RX	VCO	VC	TX	VCO	VC
GSM 850	190	881.6MHz	3526.4MHz		836.6MHz	3364.6MHz	
GSM 900	37	942.4MHz	3769.6MHz	~1.33V	897.4MHz	3589.6MHz	~1.70V
GSM 1800	700	1842.8MHz	3685.6MHz	~0.98V	1747.8MHz	3495.6MHz	~1.23V
GSM 1900	661	1960MHz	3920.0MHz	~1.93V	1880MHz	3760.0MHz	~2.53V
WCDMA	10700	2140MHz	4280.0MHz	~3.30V	1950MHz	3900.0MHz	~3.17V


PIHI
N7500
PIHI_2.11
4V
RETU
4.75V
2.5V
RETU / TXCCONV (2:0)
RAP3G / RFCLK (1:0)
FM & BT module
1.35V
RETU
RAP3G / RFCONV (11:0)
RAP3G / RFCTRL (8:0)
RETU / TXCCONV (2:0)
RAP3G / RFCONV (11:0)
RETU / SLOWAD (6:0)
RETU / SLOWAD (6:0)
WTXDET
Front end module
N7520
RF9282E6.1
GSM
antenna pads
4V
VBAT
WCDMA
antenna pads
Z7540
DUPLEX
FILTER
WCDMA power amplifier
N7540
RF9372E3.1
PA DC-DC converter
N7541
LM3202_PBFREE
Z7500
850/900MHz
M044X
T7500
EHF2BE2134
G7500
NKG3176
38.4MHz
T7501
EHF2BE3800
G7501
ENFVK3W2F07
12
GND PINS= GND
DAC101
DAC102
DAC201
DAC202

	R7503	C7510	R7504	C7514
PIHI 2.00	4k7	33p	-	-
PIHI 2.11	1k0	470p	8k2	2n2
PIHI 2.20	1k0	470p	8k2	2n2
All resistors are 1%, all capasitors are 2%				

Figure 114 RM-78, 1mda_05a: RF-part

Signal overview



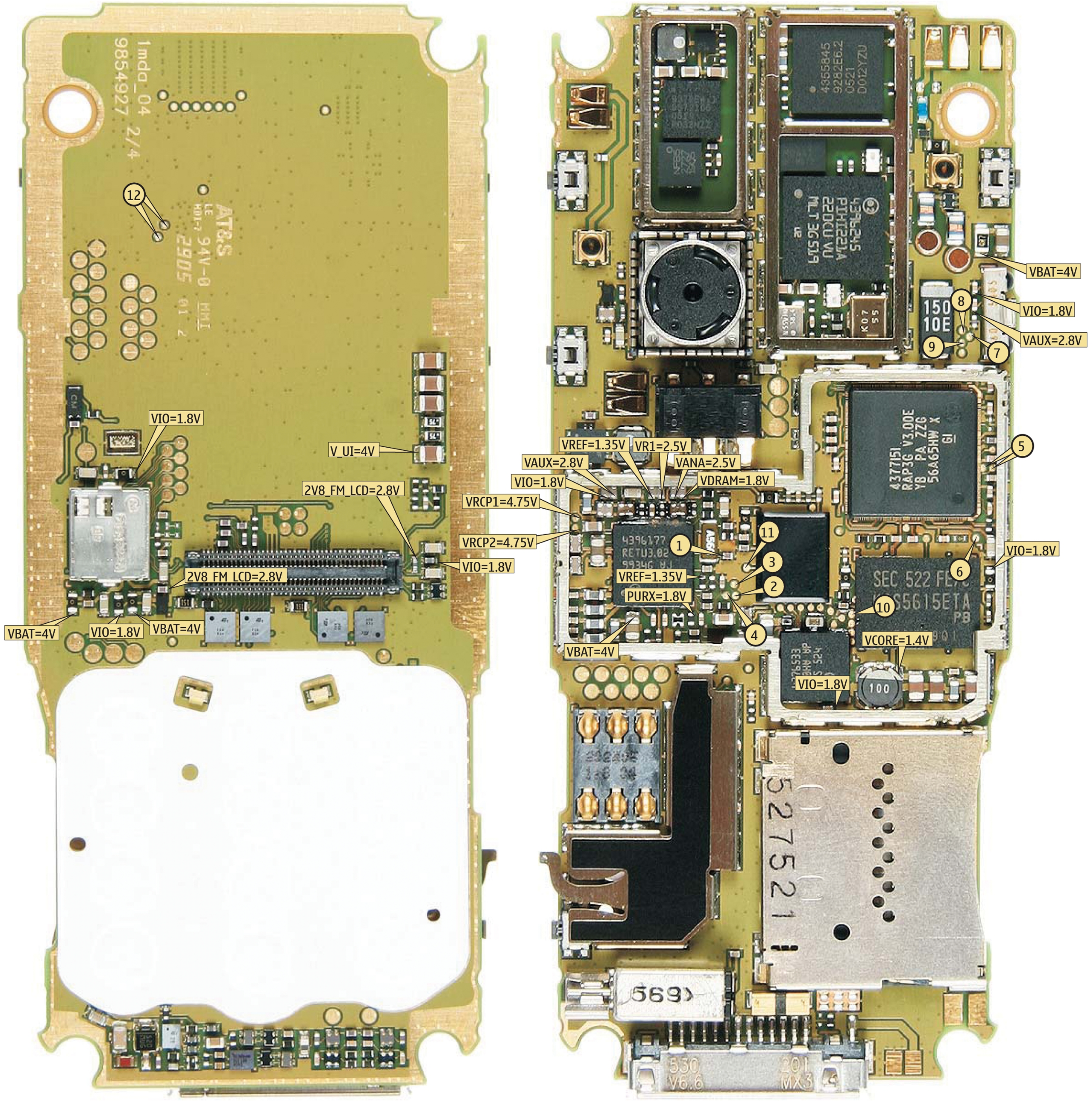

12
VIO=1.8V
V_UI=4V
2V8_FM_LCD=2.8V
2V8_FM_LCD=2.8V
VBAT=4V
VIO=1.8V
VBAT=4V
VBAT=4V
8
VIO=1.8V
9
7
VAUX=2.8V
VREF=1.35V
VR1=2.5V
VAUX=2.8V
VANA=2.5V
VIO=1.8V
VDRAM=1.8V
VRCP1=4.75V
5
VRCP2=4.75V
1
11
VIO=1.8V
VIO=1.8V
3
6
VREF=1.35V
2
PURX=1.8V
10
4
VBAT=4V
VCORE=1.4V
VIO=1.8V

Figure 115 RM-78, 1mda_05a: Signal overview

Component finder

B	
B2100	B5
B2200	J4
C	
C1000	N2
C1001	N2
C1008	M5
C1009	O2
C1010	O2
C1060	N2
C2000	A3
C2001	B2
C2002	B5
C2003	B2
C2004	B4
C2005	A4
C2007	A7
C2008	A7
C2009	A6
C2010	A6
C2011	B7
C2012	B7
C2013	B6
C2014	B6
C2015	A3
C2016	A4
C2070	M4
C2071	E4
C2100	I4
C2101	H4
C2102	I4
C2105	I2
C2106	I2
C2107	I2
C2108	C4
C2109	I2
C2110	I2
C2200	I2
C2201	K4
C2202	J3
C2203	J3
C2204	I4
C2205	I4
C2206	I4
C2207	K4
C2208	J4
C2209	K4
C2210	K2
C2211	J2
C2212	K3
C2215	K2
C2217	K3
C2220	J2
C2221	J2
C2222	K3
C2223	I3
C2224	I3
C2225	K2
C2226	K2
C2230	K3
C2231	I3
C2236	K3
C2300	H8
C2301	H9
C2302	H8
C2303	I5
C2304	G6
C2307	I5
C2309	H8
C2313	I6
C2405	J8
C2406	J8
C2430	L2
C2500	F4
C2501	F4
C2502	E6
C2503	G4
C2504	G4
C2530	M8
C2531	M8
C2532	L8
C2533	K8
C2534	L2
C2535	K8
C2536	K8
C2537	M8
C2600	P9
C2601	N9
C2602	N9
C2603	O9
C2700	H4
C2701	H4
C2800	L6
C2801	K1
C2802	L6
C2803	L6
C2804	M9
C2805	J8
C2806	J7
C2807	J9
C2808	L9
C2809	K9
C2810	M9
C2811	L6
C2812	K6
C2813	L6
C2814	J8
C2815	K9
C3000	J6
C3001	I6
C3002	I9
C3003	I9
C3006	K6
C3007	K6
C3008	K6
C3009	K5
C3100	L9
C3200	C3
C3201	D3
C3202	E3
C3203	D3
C3204	G5
C463	J5
C466	J5
C6000	J3
C6001	K3
C6002	I2
C6003	K2
C6004	I2
C6005	K2
C6006	J3
C6015	B6
C6050	I3
C6051	J3
C6052	I3
C7500	P7
C7501	O6
C7502	O5
C7503	P7
C7504	N6
C7505	N6
C7506	O7
C7507	Q7
C7508	N7
C7509	N7
C7510	N6
C7512	N6
C7514	Q6
C7515	Q6
C7516	N7
C7521	S5
C7541	S4
C7542	S4
C7543	S3
C7544	Q4
C7545	Q4
C7547	O5
C7597	N8
C8000	Q8
D	
D2530	L2
D2800	L7
D3000	J5
D3001	I8
D6000	J2
F	
F2000	A2
G	
G2200	E2
G7500	N5
G7501	N7
J	
J1013	J6
J1014	K6
J1015	J5
J1016	K5
J2000	I6
J2001	I5
J2002	I5
J2008	B6
J2010	B7
J2060	H2
J2067	H5
J2070	M5
J2071	M5
J2072	L5
J2073	E4
J2200	K2
J2201	K2
J2206	J4
J2207	I4
J2209	I4
J2218	K3
J2219	K3
J2306	I6
J2307	I6
J2308	I6
J2309	I6
J2310	I6
J2314	I6
J2430	M2
J2700	H4
J2701	H3
J2702	G4
J2703	H4
J2804	K6
J2817	K7
J2818	J9
J2820	N8
J2821	L9
J2822	L9
J2823	L9
J2824	N9
J2825	N8
J2826	N8
J3000	I6
J3001	I6
J3002	J5
J3003	L6
J3004	I6
J3005	I6
J3006	J8
J3007	J6
J3100	N2
J3101	O2
J3102	O2
J3103	O2
J3104	N2
J3105	N2
J3110	N2
J3111	N2
J3112	N3
J3113	N3
J3114	N3
J3115	N3
J3116	N3
J3117	O3
J3118	O2
J3119	O3
J3120	O2
J3200	E4
J3201	D4
J3202	D4
J3203	E3
J3204	C3
J3205	C3
J3206	D4
J3300	H7
J6000	K3
J6001	K3
J6002	K3
J6003	K3
J6004	I2
J6005	H2
J6006	H2
J6007	L2
J6008	L3
J6009	L3
J6010	L3
J6011	L3
J6020	H3
J6021	H3
J6050	I3
J7515	P3
J7516	P3
J7528	R5
J7529	R3
J7530	R3
J7531	R4
J7532	R4
J7533	R4
J7534	R4
J7535	R4
J7536	R6
J7550	O7
J7553	P4
L	
L1000	N2
L1001	M5
L2002	A5
L2003	B6
L2004	B7
L2006	A6
L2100	B5
L2101	I2
L2102	P8
L2103	P8
L2104	I2
L2105	I2
L2108	I2
L2202	K2
L2203	K3
L2204	K3
L2205	I2
L2206	K4
L2301	H8
L2302	H7
L2303	I5
L2304	I5
L2400	J8
L2401	J8
L2500	F4
L2530	L3
L3200	D3
L7500	D7
L7520	S5
L7540	S3
L7541	Q2
L7543	P5
L8000	R8
M	
M2100	B3
N	
N1060	O2
N2200	J3
N2300	H6
N2430	M2
N2500	F4
N2530	L2
N2600	N9
N3200	D3
N6050	I3
N7500	P6
N7520	S6
N7540	R4
N7541	S4
R	
R1000	J7
R1001	J7
R2000	A4
R2001	A5
R2002	B4
R2003	A5
R2004	A4
R2005	A6
R2006	A6
R2007	A7
R2008	A7
R2009	A6
R2010	A7
R2011	B3
R2012	A4
R2013	A3
R2015	B4
R2016	B3
R2019	C3
R2020	D3
R2021	D3
R2070	E4
R2100	I4
R2101	I4
R2102	I3
R2103	B5
R2104	I3
R2106	P8
R2200	J4
R2201	K4
R2202	K4
R2203	J4
R2204	J4
R2205	I4
R2400	I4
R2430	M2
R2500	F3
R2502	E3
R2531	K8
R2532	L8
R2534	K8
R2536	J8
R2537	K8
R2538	L8
R2539	K8
R2540	L8
R2581	I4
R2582	I6
R2600	P9
R2700	H4
R2800	K9
R3000	I6
R3004	I6
R3005	J9
R3006	K5
R3007	K5
R3200	D3
R3203	G5
R3204	D4
R3205	D4
R3210	E3
R3211	E3
R3212	D3
R3301	I8
R3302	I8
R3303	I8
R3541	K8
R6000	I2
R6050	I2
R6051	K2
R6052	I3
R6053	I2
R7500	N6
R7501	Q7
R7503	N6
R7504	N6
R7505	O7
R7520	R5
R7521	R7
R7522	R5
R7540	R3
R7541	S4
R7542	Q4
R7543	Q4
R7544	R3
R7570	S4
R7571	S4
R8000	Q8
S	
S2580	G2
S2581	G5
S2582	G7
S2583	C2
S2584	F2
S2585	F5
S2586	F7
S2587	Q9
S2588	D2
S2589	D5
S2590	D7
S2591	Q1
S2592	C2
S2593	C5
S2594	C7
S2595	N1
T	
T7500	Q7
T7501	O6
V	
V2000	B3
V2002	C3
V2500	F3
V2533	K8
V2581	H4
V2582	H6
X	
X1000	O4
X2000	A5
X2002	A8
X2003	A7
X2061	L3
X2070	M4
X2530	M2
X2531	M2
X2700	F2
X3200	E7
X3301	J5
X8000	Q8
X8001	S8
X8002	S8
X8003	O2
X8004	R2
X8005	R2
X8006	S9
Z	
Z2000	A4
Z2001	B4
Z2005	B4
Z2403	I4
Z2404	I5
Z2580	I7
Z3300	I6
Z7500	Q5
Z7540	Q3

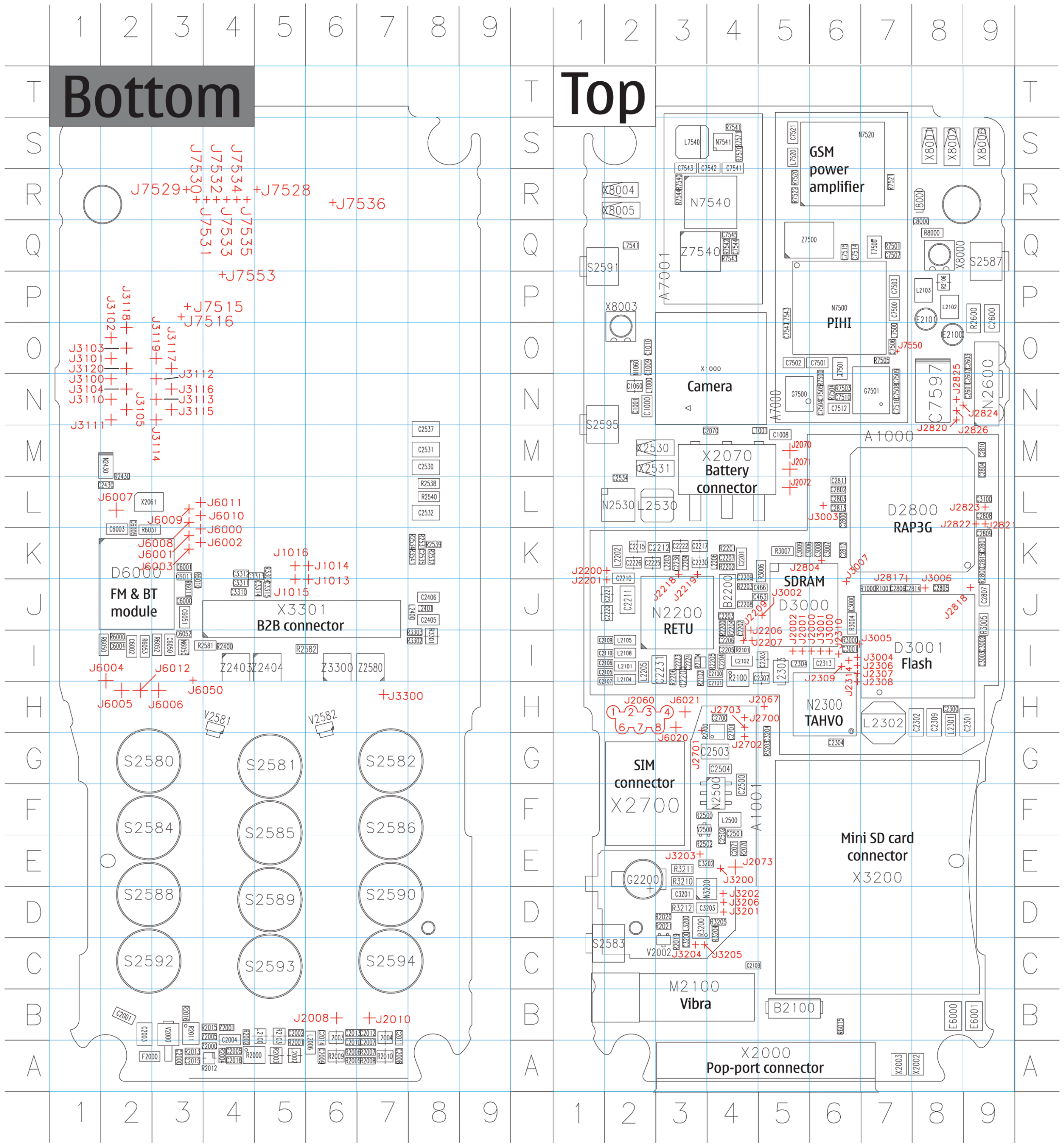

Bottom
Top
1 2 3 4 5 6 7 8 9
T S R Q P O N M L K J I H G F E D C B A
J7529
J7528
J7536
J7553
J7515
J7516
FM & BT module
D6000
X3301
B2B connector
S2580
S2581
S2582
S2584
S2585
S2586
S2588
S2589
S2590
S2592
S2593
S2594
J3300
J2008
J2010
GSM power amplifier
N7540
Z7540
A7001
PIHI
Camera
A7000
C7597
N2600
X2070
Battery connector
N2530
L2530
A1000
D2800
RAP3G
SDRAM
D3000
N2200
RETU
D3001
Flash
N2300
TAHVO
L2302
SIM connector
X2700
A1001
Mini SD card connector
X3200
G2200
S2583
M2100
Vibra
B2100
X2000
Pop-port connector
S2591
S2595
S2587
X8003
X8004
X8005

Figure 116 RM-78, 1mda_05a: Component finder

Glossary

(This page left intentionally blank.)

A/D-converter	Analog-to-digital converter
ACI	Accessory Control Interface
ADC	Analog-to-digital converter
ADSP	Application DPS (expected to run high level tasks)
AGC	Automatic gain control (maintains volume)
ALS	Ambient light sensor
AMSL	After Market Service Leader
ARM	Advanced RISC Machines
ARPU	Average revenue per user (per month or per year)
ASIC	Application Specific Integrated Circuit
ASIP	Application Specific Interface Protector
B2B	Board to board, connector between PWB and UI board
BB	Baseband
BC02	Bluetooth module made by CSR
BIQUAD	Bi-quadratic ,type of filter function)
BSI	Battery Size Indicator
BT	Bluetooth
CBus	MCU controlled serial bus connected to UPP_WD2,UEME and Zocus
CCP	Compact Camera Port
CDSP	Cellular DSP (expected to run at low levels)
CLDC	Connected limited device configuration
CMOS	Complimentary metal-oxide semiconductor circuit (low power consumption)
COF	Chip on Foil
COG	Chip on Glass
CPU	Central Processing Unit
CSR	cambridge silicon radio
CSTN	Color Super Twisted Nematic
CTSI	Clock Timing Sleep and interrupt block of Tiku
CW	Continuous wave
D/A-converter	Digital-to-analouge converter
DAC	Digital-to-analouge converter
DBI	Digital Battery Interface
DBus	DSP controlled serial bus connected between UPP_WD2 and Helgo
DCT-4	Digital Core Technology
DMA	Direct memory access
DP	Data Package

DPLL	Digital Phase Locked Loop
DSP	Digital Signal Processor
DtoS	Differential to Single ended
EDGE	Enhanced data rates for global/GSM evaluation
EGSM	Extended GSM
EM	Energy management
EMC	Electromagnetic compability
EMI	Electromagnetic interference
ESD	Electrostatic discharge
FCI	Functional cover interface
FPS	Flash Programming Tool
FR	Full rate
FSTN	Film compensated super twisted nematic
GND	Ground, conductive mass
GPIB	General-purpose interface bus
GPRS	General Packet Radio Service
GSM	Group Special Mobile/Global System for Mobile communication
HF	Hands free
HFCM	Handsfree Common
HS	Handset
HSCSD	High speed circuit switched data (data transmission connection faster than GSM)
HW	Hardware
I/O	Input/Output
IBAT	Battery current
IC	Integrated circuit
ICHAR	Charger current
IF	Interface
IHF	Integrated hands free
IMEI	International Mobile Equipment Identity
IR	Infrared
IrDA	Infrared Data Associasion
ISA	Intelligent software architecture
JPEG/JPG	Joint Photographic Experts Group
LCD	Liquid Crystal Display
LDO	Low Drop Out
LED	Light-emitting diode

LPRF	Low Power Radio Frequency
MCU	Micro Controller Unit (microprocessor)
MCU	Multiport control unit
MIC, mic	Microphone
MIDP	Mobile Information Device Profile
MIN	Mobile identification number
MIPS	Million instructions per second
MMC	Multimedia card
MMS	Multimedia messaging service
NTC	Negative temperature coefficient, temperature sensitive resistor used as a temperature sensor
OMA	Object management architechture
OMAP	Operations, maintenance, and administartion part
Opamp	Operational Amplifier
PA	Power amplifier
PDA	Pocket Data Application
PDA	Personal digital assistant
PDRAM	Program/Data RAM (on chip in Tiku)
Phoenix	Software tool of DCT4.x
PIM	Personal Information Management
PLL	Phase locked loop
PM	(Phone) Permanent memory
PUP	General Purpose IO (PIO), USARTS and Pulse Width Modulators
PURX	Power-up reset
PWB	Printed Wiring Board
PWM	Pulse width modulation
RC-filter	Resistance-Capacitance filter
RF	Radio Frequency
RF PopPort TM	Reduced function PopPortTM interface
RFBUS	Serial control Bus For RF
RSK	Right Soft Key
RS-MMC	Reduced size Multi Media Card
RSSI	Receiving signal strength indicator
RST	Reset Switch
RTC	Real Time Clock (provides date and time)
RX	Radio Receiver

SARAM	Single Access RAM
SAW filter	Surface Acoustic Wave filter
SDRAM	Synchronous Dynamic Random Access Memory
SID	Security ID
SIM	Subscriber Identity Module
SMPS	Switched Mode Power Supply
SNR	Signal-to-noice ratio
SPR	Standard Product requirements
SRAM	Static random access memory
STI	Serial Trace Interface
SW	Software
SWIM	Subscriber/Wallet Identification Module
TCXO	Temperature controlled Oscillator
Tiku	Finnish for Chip, Successor of the UPP, Official Tiku3G
TX	Radio Transmitter
UART	Universal asynchronous receiver/transmitter
UEME	Universal Energy Management chip (Enhanced version)
UEMEK	See UEME
UI	User Interface
UPP	Universal Phone Processor
UPP_WD2	Communicator version of DCT4 system ASIC
USB	Universal Serial Bus
VBAT	Battery voltage
VCHAR	Charger voltage
VCO	Voltage controlled oscillator
VCTCXO	Voltage Controlled Temperature Compensated Crystal Oscillator
VCXO	Voltage Controlled Crystal Oscillator
Vp-p	Peak-to-peak voltage
VSIM	SIM voltage
WAP	Wireless application protocol
WD	Watchdog
XHTML	Extensible hypertext markup language
Zocus	Current sensor, (used to monitor the current flow to and from the battery)